LITERATURE ON CARDIOVASCULAR DISEASES (1996-1999) : A BIBLIOMETRIC STUDY

DISSERTATION

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By

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CERTIFICATE

This is to certify that **Mr. Abdul Kadir** has completed his dissertation entitled "***Literature on Cardiovascular Diseases (1996-99): A Bibliometric Study***", in partial fulfilment of the requirements for the Degree of **Master of Library and Information Science** (1999-2000). He has conducted the work under my supervision and guidance. I deem it fit for submission.

Prof. Shabahat Husain


Dedicated to
My
Adorable Parents

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ABDUL KADIR

CHAPTER – I

BIBLIOMETRICS

INTRODUCTION

The discipline that investigates the properties and behaviour of information, the forces governing the flow of information and the means for processing information for optimal accessibility and usability is termed as "Information Science". It occurs individually as well as in combination with other words such as information analysis, information service, information source, scientific and technological information and so on.

Information may be defined as :

"Information is the message conveyed or intended to be conveyed by a systematised body of ideas or its accepted or acceptable substitutes".

- According to **D. Bell (1979)** "Information is news, facts, statistics, reports, legislation, text lodes, judicial decisions, resolutions and the like".
- According to **Machlup (1983)** "Information is the peacemeal, fragmented, timely, transitory... flow of messages."

The term information science was coined first in USA in 1959. The most significant use of the term is to be seen in the changing of the name of the American Documentation Institute (ADI) to American Society for Information Science (ASIS) in 1968. The title of its journal "American Documentation" was also changed to "Journal of the American Society for Information Science (JASIS)" in 1970.

Information Science is a discipline concerned with the study of property and behaviour of information as well as the factors influencing the flow of information.

In the present age, librarians have been observing the ever growing number of bibliographic units like books, periodicals, articles in periodicals; corresponding increase in the size of library collection, number of readers issue of library material, number of catalogue cards, changes in search strategy and so on. This becomes all the more problematic because of the inelastic budgetary provisions. Realizing these factors, no single library can afford to acquire every document. Hence, limited and selected procurement of journals seems to be one

of the practical remedies. Bibliometric is relatively of recent origin. Bibliometric studies are conducted to identify the pattern of publications, authorship, and citations used for a subject etc. over a period of time and thereby offering insight into the dynamics of the area under a particular study.

1. Bibliometerics

Bibliometric has been derived from the two words 'Biblion' and 'Metric'. The word 'Biblion' means books and 'Metric' means measurement. So, bibliometrics generally means 'measurement pertaining to books'.

It implies the use of quantitative or statistical method to study the behaviour of information.

1.1 Origin and History

First study regarding bibliometrics was conducted in 1917 by 'Cole' and Eale'. They wrote "The History of Comparative Anatomy, Part-I : A Statistical Analysis". First term used for this was "Statistical Analysis".

Henkle (1938), Gosnell (1943/44), Barker (1966) also used the same term i.e. 'Statistical Bibliography'.

In 1968 Pritchard analyzed the term 'Statistical Bibliography' and found it to be confusing with 'Statistics' and 'Bibliography on Statistics'. Therefore, he coined another term i.e. called 'Bibliometrics'.

Hence, the term bibliometrics has a very recent origin. The term librametrics, scientometrics, econometrics and informatrics are also used in literature. Bibliometrics is analogus to Ranganathan's 'Librametrics', Russian concept, 'Scientometrics', FID's 'Informatics' and also to some other well established sub-disciplines like 'Econometrics', 'Psychometrics', 'Sociometrics' and 'Biometrics'.

1.2 Definitions

Bibliometrics is that branch of science which studies the behaviour of information.

We can also say that "Bibliometric" is that branch of information theory that attempts to analyse quantitatively the properties and behaviour of recorded knowledge.

It has been defined by different people in different ways :

i) **Hulme (1923)** : The purpose of Statistical Bibliography is to shed light on the process of written communication and of the nature

and course of development of a discipline by means of counting and analysing the various facets of written communication.

ii) **Raising (1962)** : The assembling and interpretation of statistics relating to books and periodicals... use of books and journals and to ascertain in many local situations the general use of books and journals.

iii) **Pritchard (1968)** : Application of mathematical methods to books and other media of communication.

iv) **Fairthorne (1969)** : Quantitative treatment of the properties of record discourse and behaviour appertaining to it.

v) **Hamkins (1977)** : Quantitative analysis of the bibliographical features of a body of literature.

vi) **Potter** : Bibliometric is the study and measurement of the publication patterns of all forms of written communication and their authorship.

vii) **Schrader** : Bibliometric is the scientific study of recorded discourse.

viii) **Broadus** : Bibliometric is the quantitative study of physical published units or of bibliographic units of Surrogates either.

The techniques of bibliometric are simple to complex in nature. The basic units of bibliometric are all facets of written communication, such as Primary and Secondary Periodicals, Articles, Books, Monographs and other media of communication. Bibliometric techniques have extensively applied equally in sociological studies of Science Information Management, Librarianship, History of Science including Science policy, Study of Science and Scientists and also in different branches of social science. Bibliometric laws are useful in understanding some of the information phenomena and may help in planning many of the library activities, as they indicate certain basic patterns and relationships governing information items and activities. The study mostly relates to quantification of items and their pattern of distribution. Hyperbolic distribution and exponential growth are the prominent trends underlying information and document phenomena. The studies throw light on the pattern of growth of literature, productivity and influence of authors, interrelationship among different branches of knowledge, distribution of terms in information storage and retrieval pattern of collection build up, their use and the like.

2.1 Purpose of Bibliometrics

Hulme assigned its purpose as to shed light on the process of written communication and of the nature and course of development of a descriptive means of counting and analyzing the various facets of written communications.

According to Dr. S.N. Singh "The purpose of bibliometrics is to provide quantitative analysis of the phenomenon going with documents, their organization, use and services in library and information centres and systems. It offers to the information worker a type of statistical technique for the study of characteristics and attributes of literature and that of communication media".

The main purpose of bibliometric study is :

- To find major form of literature.
- To prepare a ranked list of journals.
- To make a comparison between ranked journals.
- To identify the country with greatest literary output.
- To find out the chronological scattering of all cited literature
- To ascertain the amount of utilization of language.

Some other purposes are :

- To develop norms and standardization.
- To regulate inflow of information and communication.

- To identify authorship and its trends in documents of different subjects.
- To measure useful news of adhoc and retrospective SDI services and so on

3. Utility of Bibliometrics in Research

At present, bibliometric work often provides the background for a more practical task. It is an established technique covering wide area of knowledge. It has therefore been able to involve scholars from many of these disciplines. Consequently it has attracted scholars from different disciplines or their respective fields. Day by day, it is attaining sophistication and complexity having national, international and interdisciplinary character. It has established itself as a viable and distinctive research technique for studying science of science based on bibliographic data. As a matter of fact, its backbone lies in its sound theoretical foundation most efficiently and effectively laid by some pioneers like Gross, Lotka, Bradford, Zipf, Derek J. De Solla Price, Bookstein, Massavesik, Cole Brother, Pritchard, Garfield, Hulme, Fairthorne and many others who are all not basically librarians, but belong to different branches of knowledge.

The techniques evolved by these pioneers are capable of throwing light to various complicated problems faced by many while handling information to

quantify the process of written communication. It has established itself as a viable and distinctive measurement of human knowledge. Data analysis both of citations and of volume of publications year by year can be useful in planning retrospective bibliographies.

Bibliometrics also provides information about the structure of knowledge. Its classification studies give information about the subject, language and country relationship, which is based on literary warrant. Bibliometrics is very useful in any field of research or in any discipline or it can be used in small and manageable ways by individuals, to improve some part of library or information service.

4. Bibliometric Laws

There are three fundamental laws which laid the formation of bibliometrics:

i) Lotka's inverse square law of scientific productivity (1926)

ii) Bradford's law of scattering (1934)

iii) Zipf's law of word occurrence. (1933)

4.1 Latka's Inverse Square Law (1926)

The frequency distribution of productivity of authors of scientific papers was first studied by Alfred Lotka, who proposed that the number of authors

making 'n' contributions is about $1/n^2$ of those making one contribution, and the proportion of all contributors who make a single contribution is about 60 percent, or $a(n) = k/n^2$.

Where 'a' is the number of authors producing n papers and 'k' is a constant.

In other words, for every 100 authors contributing one article, 25 will contribute two articles, about 11 will contribute 3 articles and 6 will contribute 4 articles and so on.

4.2. Bradford's Law of Scattering (1934)

This law was given by S.C. Bradford in 1934. S.C. Bradford examined two bibliographies prepared in the science library on applied geophysics and lubrication and he prepared lists of journals arranged by decreasing order of source items contributed by the journals of the Bibliographies.

He noticed that in each subject, there were a few very productive sources, large number of sources of constantly diminishing productivity. In the list of periodicals ranked by diminishing productivity, Bradford identified three groups of periodicals that produced approximately the same number of articles on the subject, but the number of periodicals in these three equi-productive zones increased by a constant factor.

Based on this he stated this law as "If scientific periodicals are arranged in order of decreasing productivity of articles on a given subject that may be divided into a nucleus of periodicals more particularly devoted to the subject and several groups or zones containing the same number of articles as the nucleus when the number of periodicals in the nucleus and succeeding zones will be given as :

$$1 : n : n^2$$

where '1' is the number of Journals in the nucleus and 'n' is a multipier

4.2 Zipf's Law of Word Occurrence (1933)

This law was given by Zipf in 1933. Zipf developed and extended an empirical law, as observed by Estoup governing a relation between the rank of a word and the frequency of its appearance in a long text.

If 'r' is the rank of a word and 'f' is its frequency, then mathematically Zipf's law can be stated as follows :

$rf = c$, where 'c' is a constant.

This law states that in a long textual matter if words are arranged in their decreasing order of frequency, then the rank of any given word of the text will be inversely proportional to the frequency of the occurrence of the word

He found that by multiplying the numerical value of each rank (r) by its corresponding frequency (f), he obtained a product (c) that is constant throughout its text e.g.

Rank (r)	Frequency (f)	Product (rf) = c
1	400	400
2	200	400
3	133	399
4	100	400
5	80	400

The above table shows distribution of words inversely proportional to the frequency of occurrence of the word.

Thus, these three laws are respectively based on

i) Number of authors contributing in a discipline or other field;

ii) Distribution of articles in a set of journals;

iii) Ranking word frequency in a particular set of documents.

OTHER LAWS

The other important laws that need to be mentioned here are :

4.3. Price's Square Root Law of Scientific Productivity

This law was given by Derek De Solla Price in 1963. This law states that "half of the scientific papers are contributed by the square root of the total number of scientific authors".

4.5 Garfield's Law of Concentration :

This law was enunciated by Eugene Garfield in 1971. This law states that "a basic concentration of journals is the common core of nucleus of all fields".

4.6 Sengupta's Law of Bibliometrics

This law has been put forward by Sengupta in 1973 which is also known as off setting weightage formula for re-ranking periodicals to avoid discrimination against new journals which necessarily have citation credits. This is basically an extension of the Bradford Law.

It states that "during phases of rapid growth of knowledge in a scientific discipline, articles of interest to that discipline appear in increasing number of periodicals distant from that field.

Mathematically this law stands in the following form :

$$F(x + y) = a + b \log(x + y)$$

Where f(x + y) is the cumulative number of references as contained in the first (x + y) most productive journals, x indicates number of journals in the same discipline and y stands for number of journals of unrelated disciplines (y > x) and 'a' and 'b' are two constants

5. SUBDIVISIONS OF BIBLIOMETRICS

5.1 Operation Research (linear Programming, Transport Problems)

5.2 Statistics (Multivariable Techniques, Trends, Correlations)

5.3 Bibliometric Laws (Laws of Zipf, Lotka and Bradford)

5.4 Citation Analysis (Networks, Science Policy)

5.5 Circulation Theory (Models)

5.6 Information Theory

5.7 Theoretical Aspects of Information and Retrieval

6. APPLICATION OF BIBLIOMETRICS

As bibliometrics lies between the border areas of Social Sciences and Physical Sciences, its techniques have extensive applications equally in sociological studies of science, information management, librarianship, history of science and also in some other branches of social science and sciences. Some of the areas where bibliometrics techniques are consistently being applied are enumerated here:

- To design information service
- In library management
- Evolution of indexing services and retrieval system

- Weeding and stacking policy
- To find out core journals by applying Bradford's Law
- To find out trends in research activities
- Trends in authorship
- To find out the distribution of scientific articles or scattering of articles through applying Bradford's Law
- To find out the productivity of scientist by applying Lotka's Law
- To lead the reader to further studies in the field
- Help in preparation of Bibliographies
- To find out the relative use of different languages
- To study the use of literature from different countries
- To study the scattering of subject
- To study the rate of collaborative research

7. LIMITATIONS IN APPLICATION

Though most of the studies tend to support the Bradford distribution some other researchers could not get the satisfactory results. Gross found that the scatter of research papers among physics deviated from that predicted by

Bradford's Law. Out of 50 bibliographies studied by Chonez, only six followed the law, he calls the law pseudo scientific

7.1 Lotka's Law

In the case of Lotka's law it was found to fit in most cases. However, the value of indexing was found to vary for different groups of scientists

Another problem with Lotka's law is that it totally ignores the potential authors who have not produced any publication so far.

7.2 Citation Analysis

In case of citation analysis, the common arguments against it are as follows :

- Too much of self citation and in-house citation.
- Practice or citing only to get the favours of the powerful or to appears others.
- Citation given just to dress up the paper
- Variation of citation rate during life time of paper
- Variation of citation rate with type of paper and speciality
- Negative citation

Because of all these limitations the empirical nature of these laws are generally questioned.

CONCLUSION

Bibliometric has emerged as the most active field of library and information science during the past few decades. It is estimated that literature on this topic occupies more than 25% of the total contribution in library and information science. Citation analysis studies form a major portion of it, pertains to the application of bibliometric laws. However, there is a long way to go in achieving perfection in the studies. Even the spread of computers for retrieval, counting and analysis are unlikely to achieve perfection in the studies. This study is merely a method, not a theory. To make it a theory and more useful, researcher must concentrate on the casual factors underlying Bibliometric phenomena. The changes that are frequently occupying in the publication practices are likely to complicate the studies in future. In such circumstances it is advisable to consider the results of such studies more as guidelines rather than ends in themselves.

Bibliometric is a formal scientific sub-discipline that includes the complex mathematical and statistical method, used to analyze bibliographical characteristics of documents. It has been recognized as the structure part of the methodology of library and information science also.

CHAPTER – II

CARDIOVASCULAR DISEASES

1. CARDIOVASCULAR SYSTEM : AN INTRODUCTION

The heart is unique among the body's vital organs (liver, kidney, lung, brain and others) because its function is purely mechanical, i.e. it pumps blood. It does propel blood to the body's tissues by a most amazing and complex series of events.

The heart is also a remarkablely durable organ. It beats 60 times a minute, 3600 times an hour, 36400 times a day and so on, but normally it never tires. When the heart is damaged by a variety of diseases it compensates remarkably. Only in the later stages of these diseases does it fail and cause symptoms.

1.1 Anatomy

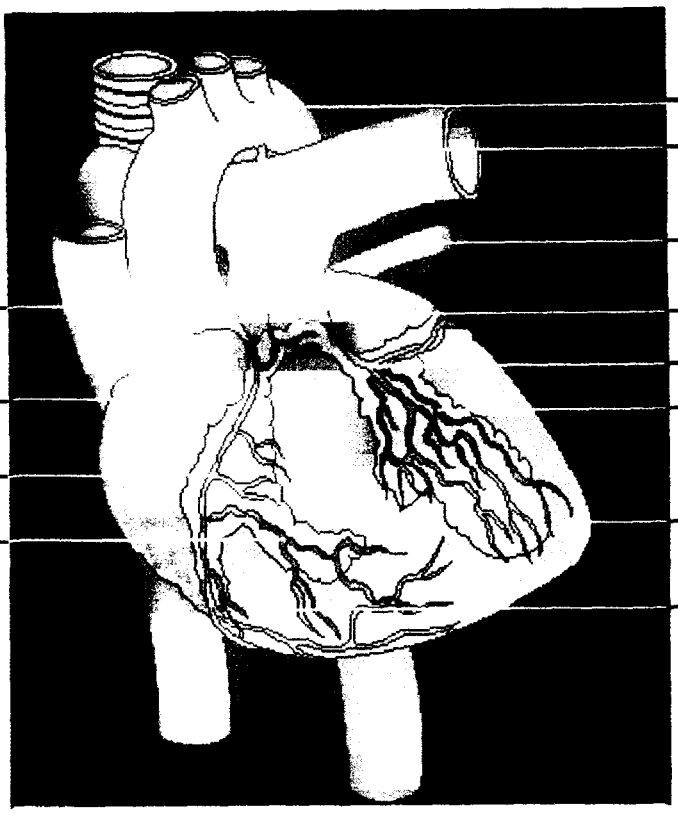
The heart is a hollow, muscular pump that lies in the middle portion of the chest, slightly to the left side. It is flanked by the right and left lungs. It is protected interiorly by the sternum and attached ribs and posteriorly by the vertebral column and the other ends of the ribs.

The heart itself is composed of three separate layers, the epicardium, the myocardium and the endocardium. The outermost layer, the epicardium, covers the surface of the heart, extends on to the great vessels and there becomes continuous with the inner lining of the pericardium. The muscular portion of the heart is called the myocardium. The innermost layer, the endocardium, is a thin, delicate layer of tissue, which lines the inside of the cardiac chambers and covers the surface of the cardiac valves.

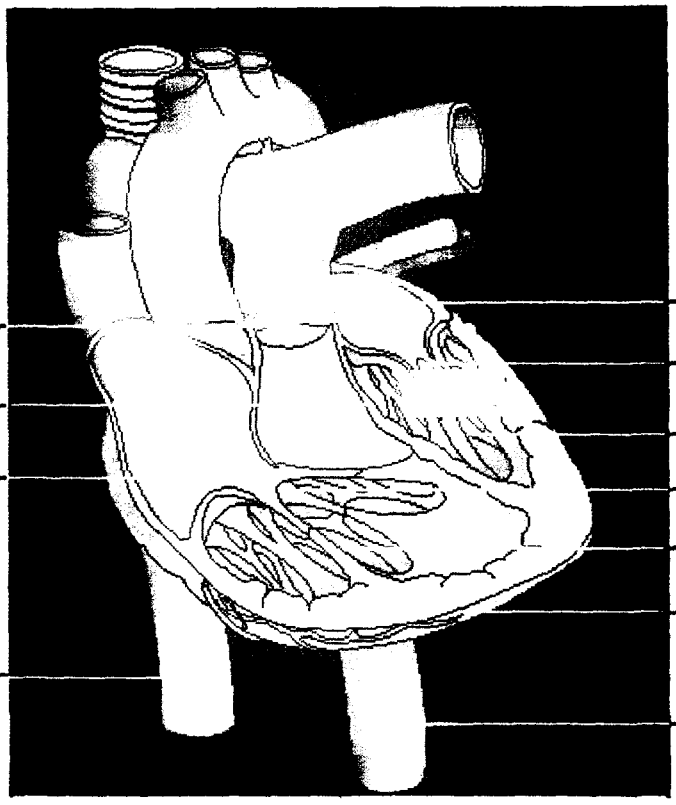
1.2 Physiology

The electrocardiography (Electro-cardiogram : ECG) reflects the electrical activity of the heart, the phono-cardiogram (PCG) indicates the heart sounds, and the pressure tracing (in the left atrium, left ventricle, and aorta) depicts pressure and flow events in the cardiac cycle.

EXTERIOR VIEW



INTERIOR VIEW



1.	Aorta	8.	Right Ventricle	15.	Pericardium
2.	Pulmonary Artery	9.	Anterior Cardiac Vein	16.	Descending Aorta
3.	Pulmonary Vein	10.	Right Coronary Artery	17.	Inferior Vena Cava
4.	Left Atrium	11.	Right Atrium	18.	Cava Septum
5.	Left Coronary Artery	12	Superior Vena Cava	19.	Pulmonary Semilunar Valve
6.	Great Cardia Vein	13.	Mitral Valve		
7.	Left Ventricle	14.	Tricuspid Valve		

2 EXAMINATION OF THE PATIENT

2.1 History

The history and physical examination provide the critical information necessary for most of decisions. It must be appreciated that history remains the richest source of information concerning the patient's illness and any practice that might diminish the quality or quantity of information provided by the history is likely ultimately to impair the quality of care. The physician's attentive and thoughtful taking of a history establishes a bond with the patient that may be valuable later in securing the patient's compliance in following a complex treatment plan, undergoing hospitalization for an intensive diagnostic work up or a hazardous operation, and, in some instances, accepting that heart disease is not present at all.

2.2 Physical Examination of the Heart

Two of the most common pitfalls in cardiovascular medicine are the failure by the cardiologist to recognize the effects of systematic illness on the cardiovascular system and the failure by the non-cardiologist to recognize the cardiac manifestations of systemic illness that have major effects on the other organ systems. In order to avoid these pitfalls, patients known to have or

suspected of having heart disease require not only a detailed examination of the cardiovascular system but a meticulous general physical examination as well.

2.3 Echo Cardiography

The term echo-cardiography refers to a group of tests that utilize ultrasound to examine the heart and record information in the form of echoes, i.e., reflected sonic waves.

2.4 Electro cardiography

The clinical electro cardiogram records the changing potentials of the electrical field imparted by the heart. The ECG does not record directly the electrical activity of the source itself. Electro cardiography serves as a gold standard for the diagnosis of arrhythmias, i.e. disturbances of impulse formation anywhere in the heart.

2.5 Exercise Stress Testing

Exercise testing is an important diagnostic and prognostic procedure in the assessment of patients with ischemic heart disease. The test is now most frequently used to estimate prognosis and to determine functional capacity, likelihood and extent of coronary disease, and effects of therapy. Ancillary

techniques such as metabolic gas analysis, radionuclide imaging, and echocardiography enhance the information contents of exercise testing in selected patients.

2.6 Cardiac Catheterization

Cardiac catheterization should be considered to be a diagnostic test for use in combination with other complementary noninvasive test in cardiology. For example cardiac catheterization in valvular or congenital heart disease is best done with full knowledge of the echocardiographic and any other functional information. Catheterization allows for measurement and analysis of heart, pulmonary artery and pulmonary capillary wedge pressures, measurement of cardiac output by thermo-dilution, screening for intracardiac shunts, temporary ventricular pacing, assessment of arrhythmias and pulmonary wedge angiography.

2.7 Radiology

There is an excellent contrast between the air filled lung and the adjacent soft tissue structures in the normal chest radiograph. As a result, the pulmonary arteries and veins and the interlabour fissures are visualized in great detail. For this reason, the chest film remains the study of first choice for the evaluation of pulmonary parenchymal and vascular disease. On the other hand, the heart and

the other mediastinal structures appears as a featureless, opaque silhouette. Blood, mycardium, pericardium, coronary arteries and great vessels, valves and mediastinal fat cannot be separated because they have similar radiographic attenuation characteristics, so that there is little or no contrast available to differentiate these structures. However, the cardiac borders are clearly outlined, and deviation from the normal configuration does suggest disease.

Thus, knowledge of the appearance of the normal and pathological cardiac silhouettes is essential for the initial evaluation of the cardiac patient.

2.8 Coronary Arteriography

Coronary arteriography is the imaging method of choice for establishing the presence or absence of coronary artery disease and for providing the most reliable information for making critical decision about the need for medical therapy, angioplasty or bypass surgery.

2.9 Nuclear Cardiology

Nuclear cardiology has been an active clinical discipline for more than two decades. Since the initial evolution from investigative studies to clinical studies, new techniques have evolved progressively. Major advances have occurred in both instrumentation and radio-pharmaceutical development. The discipline has

moved from the primary diagnostic sphere to an equally intense involvement in the functional categorization of patients.

2.10 Newer Cardiac Imaging Techniques

2.10.1 Magnetic Resonance Imaging of the Heart

Magnetic resonance imaging (MRI) has several important attributes that make it intrinsically advantageous for cardiovascular diagnosis. First, a high natural contrast exists between the blood pool and the cardiovascular structures. Second, a wide range of soft tissue contrast provides the potential for the characterization of myocardial tissue. Third, imaging can be done in any plane, including those parallel and perpendicular to the major axis of the ventricles.

2.10.2 Computed Tomography

Computed tomography (CT) scanning of the heart usually requires modification of the standard CT techniques used for investigating other parts of the body. For some purposes, such as evaluation of thoracic aortic disease pericardial disease, paracardiac and intracardiac tumours and patency of coronary arterial bypass grafts, newer standard CT scanners with exposure time of less than 2 seconds are usually adequate

Continuously rotating (spiral) CT scanners have an exposure time of 1 second for each image with no interscan delay between images at sequential anatomical levels, producing images of the entire heart in approximately 12 to 20 seconds.

3 CARDIOVASCULAR DISEASES

3.1 Coronary Heart Disease

Coronary heart disease is manifested by angina pectoris, myocardial infarction, coronary insufficiency syndrome and sudden death. Unlike most congenital and rheumatic forms of heart disease, it may be severe and life threatening, even though the physical examination, electrocardiogram (ECG), and the chest roentgenogram may be normal. The major symptom is chest pain.

3.2 Hypertension and Hypertensive Heart Disease

The higher the arterial pressure – systolic or diastolic – the greater the cardiovascular morbidity or mortality, a corollary may be stated that the higher the systolic or diastolic pressure, the greater will be the cardiovascular risk.

Recent information indicates that no matter what the cause of the hypertension, control of arterial pressure with antihypertensive drugs is associated with significantly reduced morbidity and mortality.

3.3 Rheumatic Fever

Rheumatic fever is an inflammatory disease that occurs as a sequel to group A beta-hemolytic streptococcal infection of the throat. It consists clinically of a number of manifestations that tend to occur in the same patients, simultaneously or in close succession; polyarthritis, carditis, sydenham's chorea, erythema marginatum and subcutaneous nodules.

3.4 Valvular Heart Disease

Obstruction to forward flow or regurgitation of flow at any of the four heart valves is considered to be valvular heart disease. Clinically, a broad range of severity of stenosis or regurgitation is encountered.

3.5 Mitral Valve Prolapse Syndrome

Mitral valve prolapse exists when one or both of the leaflets of the valve abnormally protrude into the left atrium during systole. Mitral regurgitation non-specific abnormality of S-T, T waves on the electrocardiogram, non-ejection systolic click (or clicks) a systolic murmur, chest pain, and cardiac arrhythmias may be present.

3.6 Endocarditis

Endocarditis is the term describing the clinical signs and symptoms occurring in patients with infection of the intact or damaged endothelium or prosthetic valves of the heart.

3.7 Myocarditis

Myocarditis is a direct infiltration of myocardial cells or their interstitum by bacteria, rickettsiae, viruses, or helminths and by the inflammatory cells generated as a response to these agents.

It may occur either as a primary event (e.g. neonatal coxsackie myocarditis) or secondary infection (e.g. subsequent to infective endocarditis or pheumonitis).

3.8 Diseases of the Pericardium

Pericardium is the term applied to any alteration of the pericardium, whether inflammatory or not, whether infectious or not. Thus, in addition to the infectious pericarditis, we have for example, myxedimatous, uremic, malignant and cholesteral pericarditis. In many cases, the most suitable term is pericardial heart disease.

3.9 Cardiomyopathies

The term cariomyopathy literally means disease of the heart muscle as opposed to endocardial, valvular, coronary or hypertensive heart disease.

3.10 Congenital Heart Disease

Congenital heart disease is a form of cardiovascular disease that is present at birth and due to a developmental abnormality. The manifestations of some forms of congenital heart disease may not appear, however, until later in childhood or even in adult life. The incidence of congenital heart disease reported for most studies is in the range of 8 to 10 per 1000 live births.

3.11 Cardiac Tumors

Tumors of the heart are a group of heterogeneous space occupying lesions that are due to either abnormal embryonic development or neoplastic proliferation. They involve the pericardium, the heart, the great vessels, or all three. Neoplastic disease is primary or secondary. Secondary involvement is 20 times that of the primary tumors.

3.12 Pulmonary Embolism

A pulmonary embolus is a mass or plug of material that moves through a systemic vein. The majority of pulmonary emboli are thrombi with a lattice work

of fibrin and enmeshed platelets and erythrocytes that originate in the veins of the lower extremity pelvis. Occasionally, emboli consisting of material other than thrombus may occur, including tumor material, which may be large when the tumor invades major veins.

3.13 Chronic Obstructive Pulmonary Disease

Chronic obstructive pulmonary disease (COPD) is a clinical syndrome of various etiologies characterized by chronic airflow limitation not explained by infiltrative lung disease or a primary cardiac disorder. COPD is diffuse chronic airflow obstruction. The most common form of COPD is chronic bronchitis or emphysema.

3.14Diseases of the Aorta

Diseases of the arteries, including the aorta, may be classified into two major categories : aneursmal and occlusive disease. The effect of a pathologic process of the aorta can weaken its wall and cause an aneurysm. The occlusive or thromboembolic problems associated with aortic disease may also be treated by surgical resection or bypass techniques.

3.15 Traumatic Heat Disease

Trauma to the heart may be due to penetrating or non-penetrating injury.

3.15.1 Penetrating Cardiac Trauma

To the heart may cause the following :

i) Pericardial wounds,

ii) Wound of the free cardiac wall and

iii) Injury to the coronary arteries

3.15.2 Non-penetrating Cardiac Trauma

To the heart may cause the following

i) Pericardial rupture,

ii) Myocardial contusion,

iii) Rupture of the free cardiac wall and

iv) Injury to the coronary arteries.

3.16 Peripheral Vascular Disease

In simplest terms, peripheral vascular diseases, when symptomatic, cause pain, changes in skin temperature or colour, swelling and ulceration of extremities and digits.

3.17 Cardiovascular Disorders in Systemic Diseases

Morphologic and functional cardiovascular abnormalities are encountered in a wide variety of systemic disorders. Cardiovascular involvement may present to the clinician as cardiac enlargement, congestive heart failure of varying severity; cardiac arrhythmias, including those resulting in sudden cardiac death; embolic phenomena, both pulmonary and systemic; chest pain syndromes; valvular diseases or pericardial disease.

3.18 Congestive Heart Failure

Heart failure refers to that condition in which the heart is unable to function adequately to supply the metabolic needs of peripheral tissues. This may be due to primary dysfunction of heart muscle or a problem with some other component of the heart, such valvular stenosis or insufficiency.

3.19 Cardiogenic Shock

Cardiogenic shock is the clinical syndrome accompanying acute myocardial infection (MI) characterized by arterial hypertension and evidence of impaired circulation to the skin, kidneys and central nervous system (CSN). Cardiogenic shock is an arterial blood pressure less than 90 mm Hg or a systolic fall of greater than 80 mm Hg in a patient previously known to have hypertension.

Cardiogenic shock results from significant destruction of left ventricular myocardium.

3.20 Cardiac Arrhythmias

Cardiac arrhythmias is defined as disturbances of impulse formation and/or conduction anywhere in the heart. In other words, most cardiac arrhythmias include any type of cardiac beats or rhythm other than normal sinus rhythm. Some cardiac arrhythmias are due to disturbances of impulse formation in the sinus mode or conduction in the sinoartrial (SA) junction.

4 TREATMENT

4.1 Diagnostic Techniques

Although many techniques for making a cardiac diagnosis are currently available, most diagnosis can be made with simple tools – the careful and detailed history, the meticulous physical examination, the electro-cardiogram and multiple-view cardiac X-Ray film. Speciall diagnostic procedures may be used to confirm diagnosis, to quantify the degree of hemodynamic disability, and to rule out unsuspected associated diseases.

4.2 Electro cardiographic Considerations

Though noninvasive cardiac monitoring has become common place since the early 1960's, mastery of electrocardiographic (ECG) interpretation remains a difficult task for the novice or inexperienced practitioner. It is perhaps useful to view the 12-lead electrocardiogram as an assessment to all that facilitates the identification of patient's problems; it offers one additional parameter for obtaining constant feedback related to cardiac performance.

4.3 Hemodynamic Monitoring and Specialized Equipment

The amount and types of specialized equipment now available to aid the nurse in caring for a critically ill patient have provided a tremendous saving in time and energy. At the same time, an increase in the knowledge of what the equipment does and how it aids in patient care is demanded of the nurse. These equipment are electrocardiogram, central venous pressure equipment, pulmonary artery pressure equipment, three bottle system, defibrillators, ultrasound, balloons, pumping etc.

4.4 Pacemaker

The sole purpose of the pacemaker is to send a specified current of electricity from a power source by way of a lead to a viable portion of the atrium

or ventricle, stimulating the cardiac muscle to contract. The first successful implantation of a pacemaker in a human being was performed by Dr. Ake Senning of Stockholm, Sweden in October, 1958.

4.5 Cardiovascular Drugs

Greater understanding of cardiovascular pharmacology combined with the ability to measure serum concentrations has improved significantly practitioners expertise in managing the patients. Cardiovascular drugs of congestive heart failure, diuretic drugs, drugs that affect the autonomic nervous system, antianginal Drugs, anticoagulant agents, antihypertensive agents, drugs that block the calcium channel, drugs that inhibit angiotensin converting enzyme and thrombolytic drugs.

4.6 Fluid, Electrolyte and Acid Base Imbalance

In the cardiac patient, the intimate relationship among fluid and electrolyte balance, acid base status and cardiovascular function may be affected when any of these factors is altered. An understanding of these components and their relationship with each other will enable to nurse to assess the patient more effectively and to implement appropriate nursing interventions.

4.7 Respiratory Care

The respiratory system must provide adequate arterial oxygen tensions for continuation of metabolic processes and the circulatory system must provide adequate output for delivery of oxygen and removal of carbon dioxide. The cardiac patient, however, presents potential problems in maintaining the balance between the respiratory and circulatory system. Good pulmonary care is therefore essential for the cardiac patient.

4.8 Cardiopulmonary Resuscitation

In clinical practice, nurses encounter many patients who are at risk for developing cardiopulmonary arrest. Only by quick and skillful action can deaths be averted. Cardiopulmonary resuscitation (CPR) is an organized method of aiding the victim of a cardiac and respiratory arrest by supporting the cardiac respiratory systems.

4.9 Direct Current Shock

Direct current shock has been widely used to terminate supra ventricular as well as ventricular tachyarrhythmias due to various causes. For successful cardioversion, it is very important to apply the procedure properly and all possible contraindications should be eliminated.

4.10 Coronary Bypass Surgery

The development of coronary artery surgery has been one of the most exciting, controversial, and rewarding medical achievements of the 1970's. It has paralleled the achievement of its medical counterpart. It is estimated that each year in USA approximately 175,000 open-heart operations are done. About 75% to 80% of these operations are coronary bypass procedures.

4.11 Acupuncture

The Word 'acupuncture' is derived from the Latin 'acus' meaning needle, and 'punctura' meaning penetrate or pierce. Acupuncture can be defined as a healing art used to alleviate pain or cure certain diseases. It involves inserting solid needles through the skin on certain spots of the body.

This ancient healing art was originated in China and the history of acupuncture can be traced back to 3000 to 4000 BC.

8. CONCLUSION

Heart is a great master on whose commands rest of the body works. Is that so? It is correct in the sense that when the heart stops functioning, all the other organs even the mind will cease to work, and the human machine will come to standstill. The whole subject of health care thus revolves around keeping the

cardiovascular forms of the human being in a perfect shape. Treatment of diseases with medical, surgical and other modalities has an important role in health care. Regarding cardiovascular diseases, WHO has in the past, held several working group meetings and published many guidelines and technical reports series on the prevention of heart attacks, control of high blood pressure and other cardiovascular diseases.

CHAPTER – III

BIBLIOMETRICS : OBJECTIVES AND METHODOLOGY

Bibliometrics is a quantitative and qualitative study based on statistical and mathematical methods. This study is helpful in management of scientific literature measuring the utility of periodicals and relationship between journals and subject areas and also in knowing the most productive contributors in a given field. Due to interdisciplinary nature of research and trends towards specialization librarians and information scientists are facing great problem in acquisition, organisation and dissemination of information. Therefore, to eliminate these problems there is a need of such type of study i.e. bibliometric study.

1. OBJECTIVES

1.1 To know the most used form of documents.

1.2 To know the languages in which the most of the literature on the subject has been published.

1.3 To know the most productive country.

1.4 To identify the scattering of subjects.

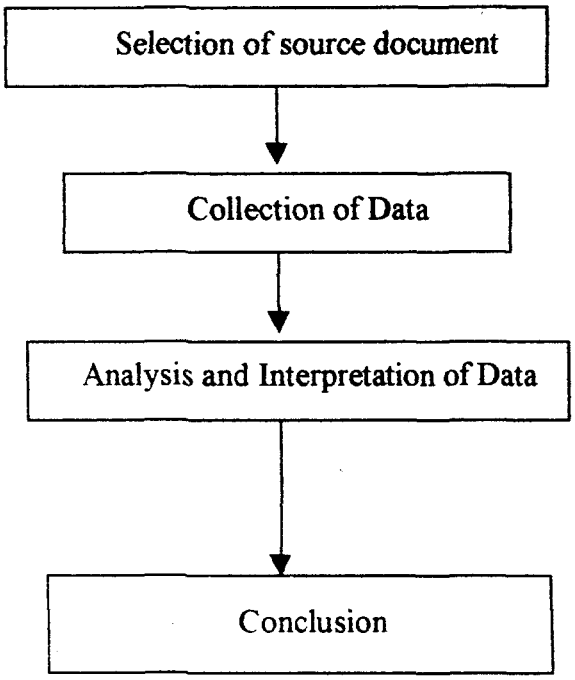
1.5 To prepare a ranked list of journals and to find out the core journals.

1.6 To know the eminent authors in the field of 'Cardiovascular Diseases'.

1.7 To know the rate of collaborative research.

2. METHODOLOGY OF BIBLIOMETRICS

The methodology of Bibliometrics can be shown through the following flow chart :



2.1 Selection of source document

The first step in this study is to select the source document from which data is to be collected. For this purpose, *Index Medicus* which is published from MEDLARS (Medical Literature Analysis and Retrieval System), Washington, U.S.A. since 1964 has been consulted.

2.2 Collection of data

From the four volumes of *Index Medicus* i.e.1996 to 1999, 4,002 references on the subject 'Cardiovascular Diseases' had been collected on 5 x 3 (inches) catalogue cards. Each card contained information about author, title, name of the periodical, place, year, language and form of document.

2.3 Analysis and Interpretation of data

In this step all the cards were arranged and rearranged in order to complete the following studies :

2.3.1 Ranking of periodicals

This is to identify the core periodicals containing the research literature on 'Cardiovascular Diseases'. For this purpose, a ranked list of periodicals was prepared.

2.3.2 Country Wise Distribution of Items

It is done to identify the place of origin of documents which is given in *Index Medicus*. The entries were grouped on the basis of their places or origin. They were then counted and ranked in a table.

2.3.3 Year Wise distribution of items

It is useful to know the occurrence of source documents. This type of study reveals the number of works in a particular year in which the most of the study is conducted. For this purpose a table showing year wise distribution has been prepared.

2.3.4 Language Wise Distribution of Items

For the purpose of language wise analysis the entries were grouped according to their language of origin. After this they were counted and then prepared a ranked list of languages.

2.3.5 Subject Wise Distribution of Items

Though most of the literature on a given subject is published in core journals but sometimes some material of research value is published in the journals belonging to related fields. The information about the subject field of periodicals was obtained from ***Ulrich International Periodicals' directory (35th ed.)***. This analysis identifies the core subjects as well as related subjects on the 'Cardiovascular Diseases'.

2.3.6 Form Wise Distribution

The literature is published in different forms like books, bulletins, patents, articles, reports etc. The information regarding the form was collected from *Index Medicus*, tabulated to find out the most dominant form of literature.

2.3.7 Ranking of Authors

It is done to know the most productive contributors in the subject. For the purpose of ranking of authors the information about all the authors was retrieved, arranged and tabulated in the order of decreasing frequency of their contributions.

2.3.8 Application of Bibliometric Laws

The whole study depends upon the application of bibliometric laws such as Lotka, Bradford and Zipf's Laws. These laws were applied to the analyzed data to check their validity.

CONCLUSION

The last step of this study is to conclude the findings of the study.

in the subject under study will be useful from the point of view of scientists and librarians alike.

The main aim of the present study is to identify the most important journals containing the most of the literature of research value in the field of cardiovascular diseases. This information of core journals in various subjects will go a long way in preparing the subscription list of periodicals by libraries. The information is useful for the information scientists as well.

In the collected data, all the 4,002 references were found to be published in 812 periodicals, which have been ranked up to 45th position. However, table 1 lists only 190 periodicals, in which the frequency of occurrence of items is up to 3. The periodicals with less than 3 items have not been considered. Table1 shows that the first rank was occupied by the journal titled '***Circulation***' which accounts for 6.69 % of total references. Next four positions are occupied by journals like '***Diabetes Care***' (3.77%), '***Journal of Cardiovascular Risk***' (3.02%), '***Journal of American Medical Association***' (2.99%) and '*Lancet*' (2.74%) respectively.

Table 1 and Table 1.1 show that most of the literature on 'Cardiovascular Diseases' appeared in 8 periodicals as a total number of 1071 items constituting 26.76% of the total, appeared in those periodicals. They may be regarded as core journals in the field.

14.	14	Archives of Internal Medicine	USA	50	1.24
15.	15	Arteriosclerosis. Thrombosis and Vas cular Biology	USA	46	1.14
16.	16	American Journal of Hypertension	USA	44	1.09
17.	17	Journal of Human Hypertension	England	43	1.07
18.	18	Journal of Hypertension	England	34	0.84
19.	19	Annals of Epidemiology	USA	31	0.77
20.	19	Cardiologia	Italy	31	0.77
21.	20	Current Openion in Lipidology	USA	29	0.72
22.	21	American Heart Journal	USA	28	0.69
23.	21	Journal of American College of Cardiology	USA	28	0.69
24.	21	New England Journal of Medicine	USA	28	0.69
25.	22	Zettschrift fur Kardiologie	Germany	26	0.64
26.	23	Nederlands Tijds Chrift Voor Genees Knucle	Netherlands	26	0.64
27.	24	Annals of Internal Medicine	USA	24	0.59
28.	24	Archives Des Maladies Du Coeur Et Des Vaisseaux	France	24	0.59
29.	25	Clinical & Experimental Pharmacology & Physiology	Australia	23	0.57
30.	26	Diabetologia	Germany	22	0.54
31.	27	Nephrology, Dialysis, Transplantation	England	21	0.52
32.	27	Geornale Italiano Di Cardiologia	Italy	21	0.52
33.	27	Heart	England	21	0.52
34.	28	Hypertension	USA	20	0.49
35.	28	International Journal of Obesity & Related Metabolic Disorders	England	20	0.49
36	29	Journal of Epidemiology and Community Health	England	19	0.47
37.	29	American Journal of Medicine	USA	19	0.47
38.	29	Contraception	USA	19	0.47
39.	30	Diabetic Medicine	England	18	0.44
40.	30	Journal of Clinical Epidemiology	England	18	0.44
41	31	Ugeskrift for Laeger	Denmark	17	0.42
42.	31	Cardiovascular Research	Netherlands	17	0.42
43.	31	Revista Portuguesa De Cardiologia	Portugal	17	0.42
44.	31	American Journal of Public Health	USA	17	0.42
45.	31	Current Opinion in Nephrology and Hypertension	USA	17	0.42
46.	32	Medicine and Science in Sports and Exercise	USA	16	0.39
47.	33	Metabolism	USA	15	0.37
48.	33	Canadian Medical Association Journal (CMAJ)	Canada	15	0.37
49.	33	Current opinion in cardiology	USA	15	0.37
50.	33	Diabetes and Metabolism	France	15	0.37
51.	33	Diabetes Research and Clinical Practice	Ireland	15	0.37
52.	33	Family Practice	England	15	0.37
53.	34	International Journal of Epidemiology	England	12	0.29

54	34	Journal of the American Geriattrics Society	USA	12	0.29
55	35	Journal of Internal Medicine	England	11	0.27
56.	35	Medical Journal of Australia	Australia	11	0.27
57.	35	Nutrition Reviews	USA	11	0.27
58.	36	Thrombosis and Haemostasis	Germany	10	0.24
59.	37	Arquivos Brasileiros De Cardiologia	Brazil	09	0.22
60.	37	Blood Pressure	Norway	09	0.22
61.	37	British Journal of General Practice	England	09	0.22
62.	37	Cardiology Clinics	USA	09	0.22
63.	37	Clinical Cardiology	USA	09	0.22
64.	38	Journal of Cardiovascular Nursing	USA	08	0.19
65.	38	Journal of Nuclear Cardiology	USA	08	0.19
66.	38	Journal of Paediatrics	USA	08	0.19
67.	38	Journal of Women's Health	USA	08	0.19
68.	38	Acta Cardiologica	Belgium	08	0.19
69.	39	Drugs	New Zealand	07	0.17
70.	39	European Journal of Clinical Investigation	England	07	0.17
71.	39	Journal of Cardiopulmonary Rehabilitation	USA	07	0.17
72.	39	Mineral and Electrolyte Metabolism	Switzerland	07	0.17
73.	39	Peritoneal Dialysis International	USA	07	0.17
74.	40	Revista Espanola De Cardiologia	Spain	06	0.14
75.	40	Schweizerische Medizinische Wochenschrift	Switzerland	06	0.14
76.	40	Schweizerische Rund Schau fur Medizin Praxis	Switzerland	06	0.14
77.	40	South African Medical Journal	South Africa	06	0.14
78.	40	Sozial-undPraventiv Medizin	Switzerland	06	0.14
79.	40	American Family Physician	USA	06	0.14
80.	41	Annals of New York Academy of Science	USA	05	0.12
81.	41	Bratislavske Lekarske Listy	Slovakia	05	0.12
82.	41	Chest	USA	05	0.12
83.	41	Clinical and Experimental Hypertension	USA	05	0.12
84	41	Epidemiology	USA	05	0.12
85.	41	Fortschritte Der Medizin	Germany	05	0.12
86.	41	Griatrics	USA	05	0.12
87.	41	Harefuah	Israel	05	0.12
88.	41	Journal of American Society of Nephrology	USA	05	0.12
89.	41	Journal of the Health Care for the Poor and Underserved	USA	05	0.12
90.	41	Lakartidninagen	Sweden	05	0.12
91.	41	Likarska Sprava	Ukraine	05	0.12
92.	41	Medical Hypothesis	England	05	0.12
93.	41	Medicina Clinica	Spain	05	0.12
94.	41	Medicine Tropicale	France	05	0.12

95.	42	Minerva Cardioangiologica	Italy	04	0.09
96.	42	Nature Medicine	USA	04	0.09
97.	42	Nutrition	USA	04	0.09
98.	42	Obesity Research	USA	04	0.09
99.	42	Preventive Medicine	USA	04	0.09
100.	42	Prezeglad Lekarski	Poland	04	0.09
101	42	Radiology	USA	04	0.09
102	42	Revista Medica De Chile	Chile	04	0.09
103	42	Scandinavian Journal of work, Environment & Health	England	04	0.09
104.	42	Stroke	USA	04	0.09
105.	42	Voprosy Kurortologii, Fizioteropii I Lechebnoi Fizicheskoi Kultury	Russia	04	0.09
106.	42	American Journal of Kidney Diseases	USA	04	0.09
107.	42	American Journal of Obstetrics & Gynecology	USA	04	0.09
108.	42	Annals De Endocrinologie	France	04	0.09
109.	42	Anales De Medicina Interna	Spain	04	0.09
110.	42	Annali Italiani Di Medicina Interna	Italy	04	0.09
111.	42	Canadian Journal of Public Health	Canada	04	0.09
112.	42	Coronary Artery Disease	USA	04	0.09
113.	42	Diabetes	USA	04	0.09
114.	42	European Journal of Clinical Nutrition	England	04	0.09
115.	42	Journal of American Dietetic Association	USA	04	0.09
116.	42	Journal of Cardiovascular Pharmacology	USA	04	0.09
117.	42	Journal of Epidemiology	Japan	04	0.09
118.	42	Journal of Psychosomatic Research	England	04	0.09
119.	42	Maturitas	Ireland	04	0.09
120.	42	Morbidity & Mortality Weekly Report (MMWR)	USA	04	0.09
121.	42	Neurology	USA	04	0.09
122.	42	Novartis Foundation Symposium	England	04	0.09
123.	42	Orvosi Hetilap	Hungary	04	0.09
124.	42	Pathologie Biologie	France	04	0.09
125.	42	Psychosomatic Medicine	USA	04	0.09
126.	42	Revue De Medecine Interne	France	04	0.09
127.	42	Revue Medicale De Liege	Belgium	04	0.09
128.	42	Scandinavian Journal of Primary Health Care	Norway	04	0.09
129.	42	Wiener Klinische Wochenschrift	Austria	04	0.09
130	42	Aging	Italy	04	0.09
131	42	American Journal of Preventive Medicine	USA	04	0.09
132.	42	Annals De Biologie Clinique	France	04	0.09
133.	42	Annals of Medicine	England	04	0.09
134.	42	Atencion Primaria	Spain	04	0.09

135.	43	Canadian Journal of Public Health	Canada	03	0.07
136.	43	Casopis Lekarv Cexkych	Czech. Republic	03	0.07
137.	43	Circulation Research	USA	03	0.07
138.	43	Cleveland Clinic Journal of Medicine	USA	03	0.07
139.	43	Clinical Science	USA	03	0.07
140.	43	Clinics in Chest Medicine	USA	03	0.07
141.	43	Diabetes Metabolism Reviews	USA	03	0.07
142.	43	International Journal of Cardiology	Ireland	03	0.07
143.	43	Israel Journal of Medical Sciences	Israel	03	0.07
144.	43	Journal of Family Practice	USA	03	0.07
145	43	Journal of Medical Libanais	Lebanon	03	0.07
146.	43	Journal of Molecular Medicine	Germany	03	0.07
147.	43	Mayo Clinic Proceedings	USA	03	0.07
148.	43	Medizinische Klinik	Germany	03	0.07
149.	43	Molecular Medicine Today	England	03	0.07
150.	43	Pediatrics	USA	03	0.07
151.	43	Physical Therapy	USA	03	0.07
152.	43	Postepy Higieny I Medycyny Doswiadczalnej	Poland	03	0.07
153	43	Progress in Cardiovascular Nursing	USA	03	0.07
154.	43	Public Health Reports	USA	03	0.07
155	43	Reviews on Environmental Health	Israel	03	0.07
156.	43	Revista Clinica Espanola	Spain	03	0.07
157.	43	Revue D Epidemiologie Et De Sante Publique	France	03	0.07
158.	43	Rinsho Byori	Japan	03	0.07
159.	43	Sports Medicine	New Zealand	03	0.07
160.	43	Terapevticheskii Arkhiv	Russia	03	0.07
161.	43	Therapie	England	03	0.07
162.	43	Tidsskrift for Den Norske Loege Forening	Norway	03	0.07
163.	43	Acta Paediatrica	Norway	03	0.07
164.	43	Advances in Peritoneal Dialysis	Canada	03	0.07
165.	43	American Journal of Industrial Medicine	USA	03	0.07
166.	43	American Journal of Medical Sciences	USA	03	0.07
167.	43	Annales De Cardiologie Et D Angeiologie	France	03	0.07
168.	43	Annals of Clinical Biochemistry	England	03	0.07
169.	43	Archives of Medical Research	Mexico	03	0.07
170.	43	Australian & New Zealand Journal of Medicine	Australia	03	0.07
171.	43	Australian & New Zealand Journal of Public Health	Australia	03	0.07
172.	43	British Journal of Hospital Medicine	England	03	0.07
173.	43	Bulletin of the Institute of Maritine & Tropical Medicine in Gdynia	Poland	03	0.07
174.	43	Canadian Journal of Psychiatry	Canada	03	0.07

175.	43	Cardiology	Switzerland	03	0.07
176.	43	Cardiovascular & Interventional Radiology	USA	03	0.07
177.	43	Clinical Autonomic Research	England	03	0.07
178.	43	Clinical Chemistry and Laboratory Medicine	Germany	03	0.07
179.	43	Clinical and Investigative Medicine	Canada	03	0.07
180.	43	Clinical Pharmacology & Therapeutics	USA	03	0.07
181.	43	Contribution of Nephrology	Switzerland	03	0.07
182.	43	Deutsche Medizinische Wochenschrift	Germany	03	0.07
183.	43	Drugs and Aging	New Zealand	03	0.07
184.	43	Ethnicity and Disease	USA	03	0.07
185.	43	Gesundheitswesen	Germany	03	0.07
186.	43	Herz	Germany	03	0.07
187.	43	Hospital Practice	England	03	0.07
188.	43	Human Reproduction	England	03	0.07
189.	43	International Archives of Occupational & Environmental Health	Germany	03	0.07
190.	43	International Journal for Quality in Health Care	England	03	0.07

TABLE 1.1

Showing Range of Frequency

S.No.	Frequency Range	No. of Periodicals	No. of Items	Percentage	Cumulative Percentage
1.	95-300	8	1071	26.76	26.76
2.	90-94	2	187	4.67	31.43
3.	71-90	1	87	2.17	33.60
4.	51-70	2	110	2.74	36.34
5.	41-50	4	183	4.57	40.91
6.	31-40	3	96	2.39	43.33
7.	21-30	13	321	8.02	51.32
8.	15-20	19	324	8.09	59.41
9.	10-14	6	67	1.67	61.08
10.	05-09	36	231	5.77	66.85
11.	03-04	196	328	8.19	75.04
12.	01-02	622	997	24.91	99.95
	Total	**812**	**4002**	**99.95**	

2. COUNTRY WISE DISTRIBUTION

It is a well known fact that certain countries give more research output in a particular subject than other. This information is very much useful not only for the information managers in finalizing the subscription list of the periodicals but also for the research scholars as they tend to know the countries that are leaders in the field.

Table 2 contains a list of 51 countries producing research material on cardiovascular diseases. These countries have been ranked on the basis of frequency of occurrence of items. It was observed that 31.18% of the total articles were published from U.S.A. only. This is followed by England and Germany which produce 21.88% and 8.04% research items respectively.

The analysis not only shows the most potent countries of research on 'Cardiovascular Diseases' but also indicates the wide coverage of *Index Medicus*, as the publications from 51 countries of the world have been listed.

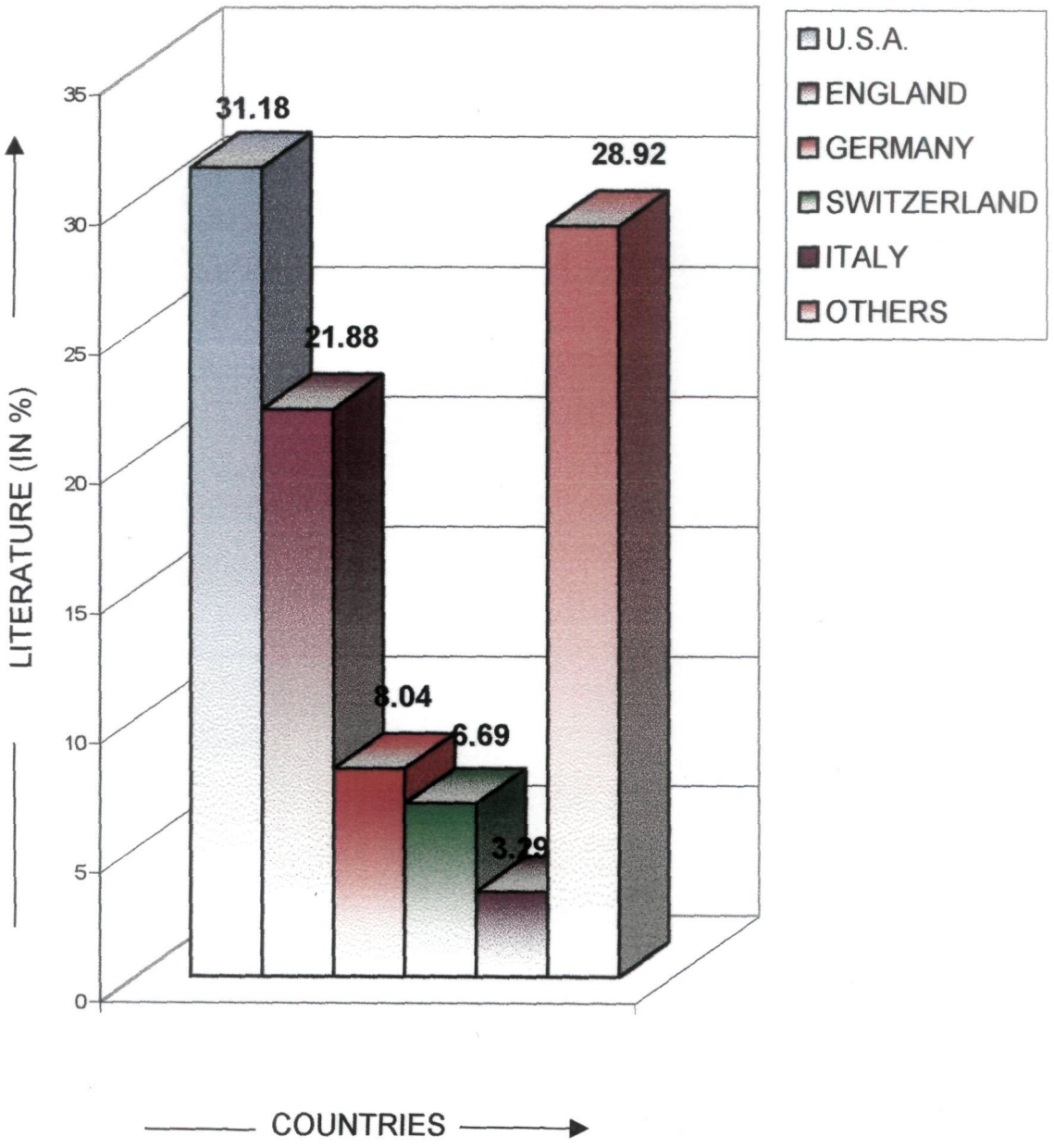
TABLE — 2

Country Wise Distribution

S. No.	Rank	Name of the Country	Frequency of Occurrence	Percentage
1.	1	U.S.A.	1248	31.18
2.	2	England	876	21.88
3.	3	Germany	322	8.04
4.	4	Switzerland	268	6.69
5.	5	Italy	132	3.29
6.	6	France	120	2.99
7.	7	Russia	90	2.24
8.	8	Japan	89	2.22

9.	9	Netherlands	85	2.12
10.	10	Poland	73	1.82
11.	11	Spain	58	1.74
12.	12	Canada	70	1.44
13.	13	Australia	52	1.29
14.	14	China	46	1.14
15.	15	Ireland	45	1.12
16.	16	Norway	43	1.07
17.	17	Denmark	38	0.94
18.	18	Czech. Republic	35	0.87
19.	19	Belgium	33	0.82
20.	20	India	31	0.77
21.	21	Mexico	28	0.69
22.	22	New Zealand	26	0.64
23.	23	Israel	21	0.52
24.	24	Sweden	15	0.37
25.	25	Austria	14	0.34
27.	26	Romania	10	0.24
28.	26	Brazil	10	0.24
29.	26	Chile	10	0.24
30.	27	Croatia	09	0.22
31.	27	Finland	09	0.22
32.	27	Lebanon	09	0.22
33.	27	Portugal	09	0.22
34.	28	Singapore	08	0.19
35.	29	Taiwan	07	0.17
36.	29	Thailand	07	0.17
37.	29	Yugoslavia	07	0.17
38.	30	Bulgaria	05	0.12
39.	30	Kenya	05	0.12
40.	31	Korea	04	0.09
41.	31	Pakistan	04	0.09
42.	32	Puerto Rico	03	0.07
43.	32	Scotland	03	0.07
44.	32	Senegal	03	0.07
45.	33	Slovakia	02	0.04
46.	34	South Africa	01	0.02
47.	34	Sri Lanka	01	0.02
48.	34	Tunisia	01	0.02
49.	34	Ukraine	01	0.02
50.	34	Venezuela	01	0.02
51.	34	Zimbabwe	01	0.02
		Total	**4002**	**98.42**

DIAGRAM - 1 REPRESENTING COUNTRY WISE LITERARY OUTPUT



3. YEARWISE DISTRIBUTION

Currency of information is an important factor for any good indexing service. The main objective of the chronological study is to find out current information published by *Index Medicus*. This study is too much useful in knowing the currency of information and also in knowing the most productive year of items ranked. Through this study we know that how many articles were published in which year

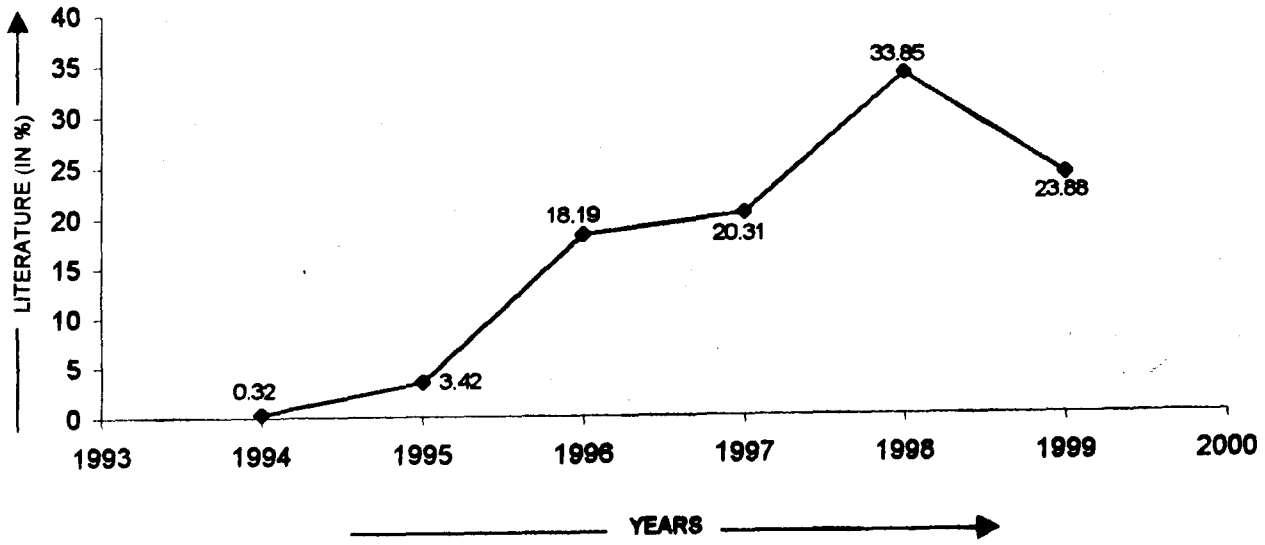
Table 3 shows the chronological scattering of all references. It gives the number of items published in the volumes of 1996, 1997, 1998 and 1999 in *Index Medicus* in different years. It is to be observed that the highest frequency of occurrence of items in the volume of 1996, 1997, 1998 and 1999 were 680, 738, 1224 and 956 respectively. However, the total percentage of the frequency of occurrence of items in four volumes of *Index Medicus* was the highest i.e. 33.85%, in 1988. This is followed by 1999, 1997, 1996, 1995 and 1994 with a total percentage of frequency of occurrence as 23.88%, 20.31%, 18.19%, 3.42% and 0.32% respectively. For the 1993 references have not been published in volumes of 1996, 1997, 1998 and 1999 of *Index Medicus* .

TABLE – 3

Yearwise Distribution

S No.	Period of Origin	Frequency of Occurrence of Items in				Total Frequency of Occurrence	Percentage Frequency of Occurrence	Cumulative Percentage Frequency
		Volume 1996	Volume 1997	Volume 1998	Volume 1999			
1.	1993	-	-	-	-	-	-	-
2.	1994	13	-	-	-	13	0.32	0.32
3.	1995	109	28	-	-	137	3.42	3.74
4.	1996	680	45	3	-	728	18.19	21.93
5.	1997	-	738	75	-	813	20.31	42.24
6.	1998	-	-	1224	131	1355	33.85	76.09
7.	1999	-	-	-	956	956	23.88	99.97
	Total	**802**	**811**	**1302**	**1087**	**4002**	**99.97**	

DIAGRAM - 2 REPRESENTING YEAR WISE DISTRIBUTION OF ITEMS



4. LANGUAGE WISE DISTRIBUTION

It is always useful for the researchers to know the language in which materials in their area of specialization is published. This type of study provides information about the most dominant language or languages in which the literature on the subject 'Cardiovascular Diseases' is being produced.

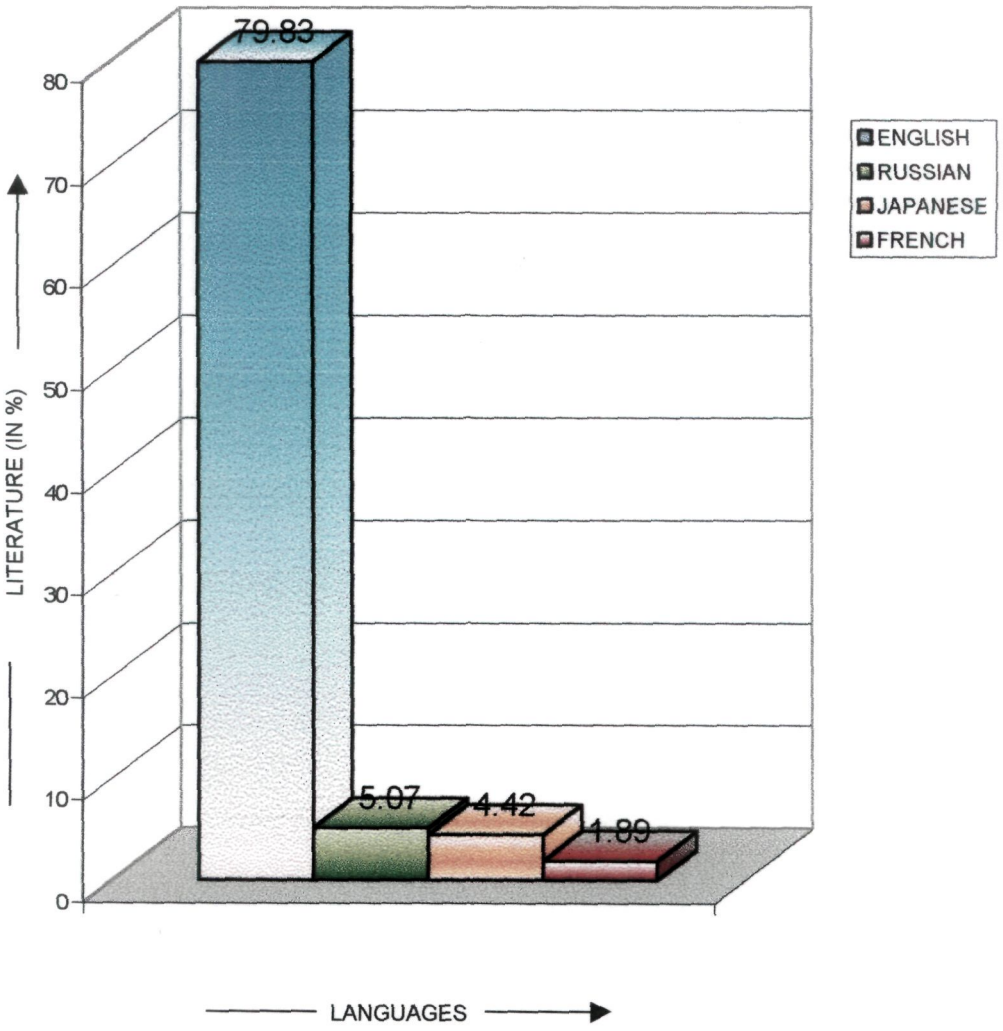
Table 4 shows the distribution of items according to the language of their publication. Out of a total of 4,002 items, 3195 (79.83%) were published in English language. The second and third rank goes to Russian and Japanese with 202 (5.04%) and 177 (4.42%) items respectively. This is followed by French, Spanish, German, Polish, Portuguese, Italian, Romanian etc.

TABLE – 4

Languagewise Distribution

S. No.	Rank	Name of Language	Frequency Occurrence	Frequency (%)	Cumulative Frequency (%)
1.	1	English	3195	79.83	79.83
2.	2	Russian	202	5.04	84.87
3.	3	Japanese	177	4.42	89.29
4.	4	French	76	1.89	91.18
5.	5	Spanish	60	1.49	92.67
6.	6	German	53	1.32	93.99
7.	7	Polish	38	0.94	94.93
8.	8	Portuguese	35	0.87	95.80
9.	9	Italian	31	0.77	96.57
10.	10	Romanian	30	0.74	97.31
11.	11	Norwegian	28	0.69	98.00
12.	12	Hungarian	15	0.37	98.37
13.	13	Chinese	13	0.32	98.69
14.	14	Dutch	10	0.24	98.93
15.	15	Slovak	07	0.17	99.10
16.	16	Danish	06	0.14	99.24
17.	17	Serbo-Croatian Cyrillic	05	0.12	99.36
18.	17	Serbo-Croatian Roman	05	0.12	99.48
19.	18	Ukrainian	04	0.09	99.57
20.	18	Swedish	04	0.09	99.66
21.	19	Czech	03	0.07	99.73
22.	20	Bulgarian	02	0.04	99.77
23.	20	Hebrew	02	0.04	99.81
24.	21	Korean	01	0.02	99.83
		Total	**4002**	**99.83**	

DIAGRAM - 3 LANGUAGE WISE DISTRIBUTION OF ITMES



5. FORM WISE DISTRIBUTION

The literature on the subject 'Cardiovascular Diseases' has been published in many different forms such as books, periodicals, conferences, proceedings, meeting reports, news letters, bulletins, patents etc. The main objective of this analysis is to know the forms in which the literature on the subject 'Cardiovascular Diseases' is being published. This study helps the information scientists as well as the users in knowing the most productive form of literature on the subject.

Analysis of collected data showed that literature on the subject was published in four different forms as shown in Table-5. It is evident from the table that, 3689 items constituting 92.17% of the total data collected was published in the form of periodical articles. The next positions were occupied by conference proceedings, meeting reports and news letters with 154(3.84%), 96(2.39%) and 63(1.57%) references respectively.

It may thus be stated that articles published in journals are the most vital media of communication among scientists belonging to the subject 'Cardiovascular Diseases'.

TABLE – 5

Formwise Distribution

S. No.	Rank	Name of the Form	Frequency Occurrence	Frequency (%)	Cumulative Frequency (%)
1.	1	Article	3689	92.17	92.17
2.	2	Conference Proceedings	154	3.84	96.01
3.	3	Meeting Reports	96	2.39	98.40
4.	4	News Letters	63	1.57	99.97
		Total	**4002**	**99.97**	

DIAGRAM - 4 FORM WISE DISTRIBUTION

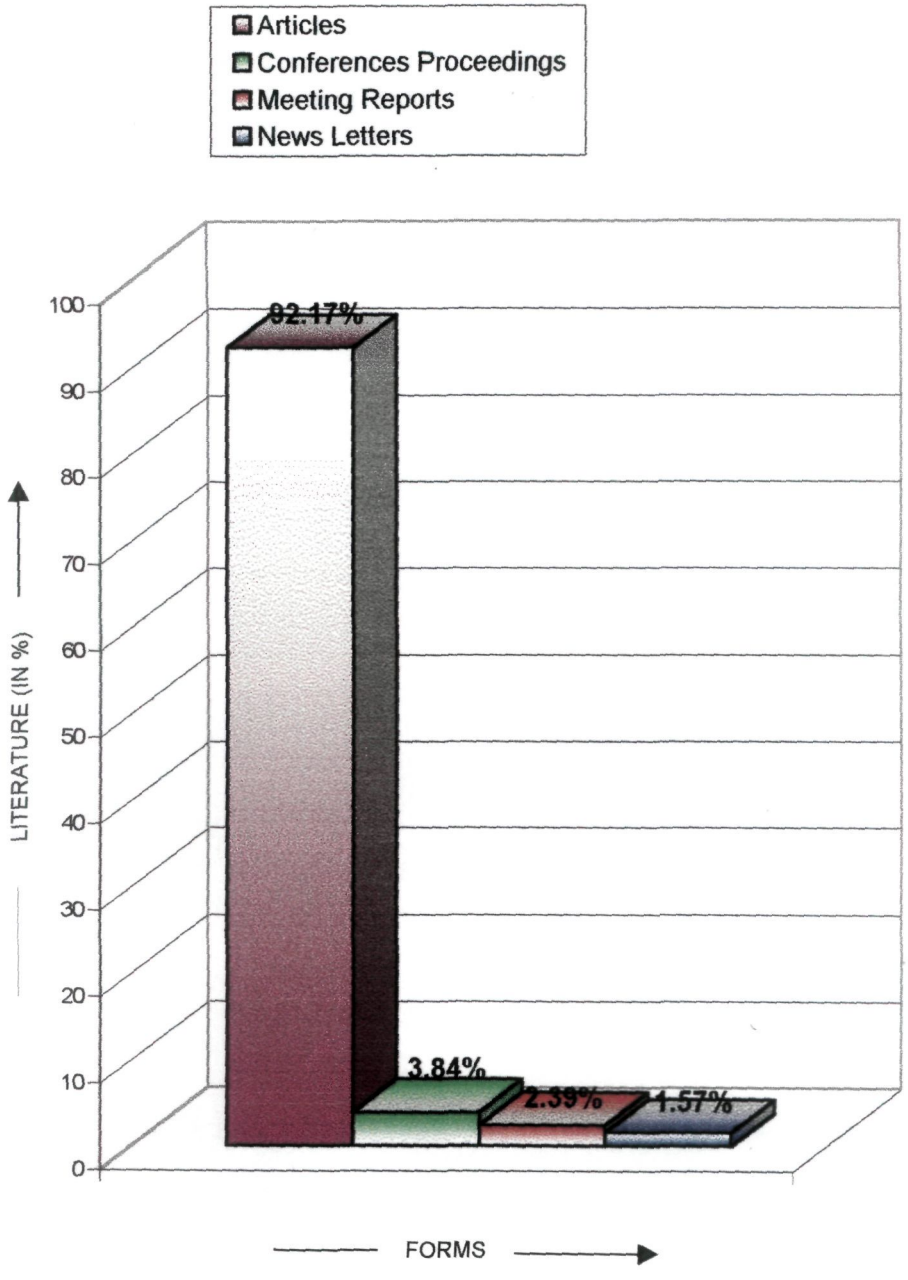
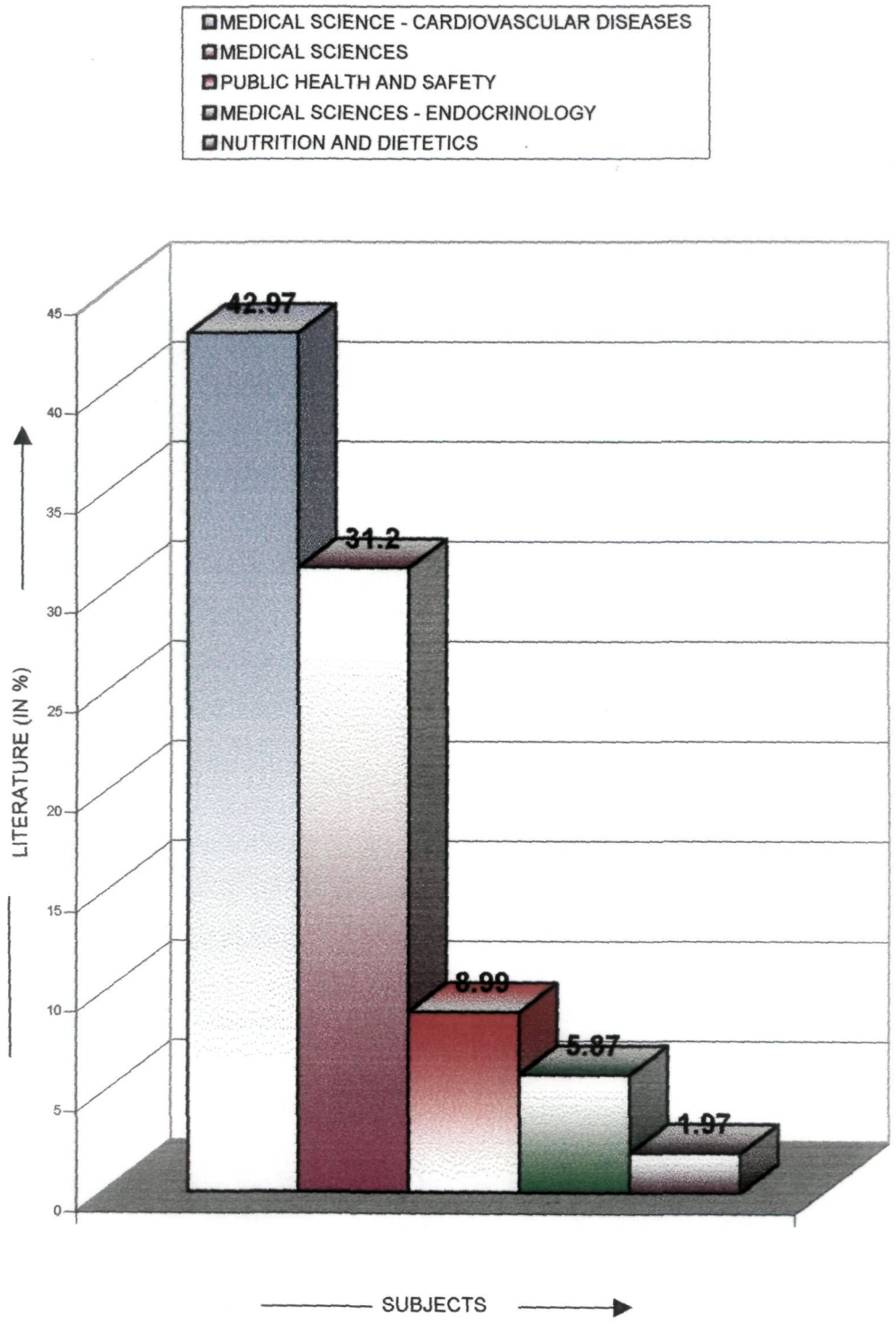


DIAGRAM - 5 SUBJECTWISE DISTRIBUTION OF ITEMS



6. Subject Wise Distribution

As discussed earlier most of the materials on a given subject appear in certain core journals. However, a sizable amount of literature is also published in periodicals of other related subjects. This analysis has been done on the basis of subject field of periodicals publishing the literature. ***Ulrich International Periodicals Directory (35th ed.)*** has been used to know the subject fields of various periodicals. However, for 13 journal titles, no information about their subject fields could be traced in the directory.

Table – 6 gives a subject wise break up in the field of 'Cardiovascular Diseases'. The data shows that the highest percentage of documents (i.e. 1720 items constituting 42.97% of the collected data fall under 'MEDICAL SCINECES – CARDIOVASCULAR DISEASES'. The second, third, fourth and fifth positions go to the 'MEDICAL SCIENCES' with 1249 items (31.20%), 'PUBLIC HEALTH AND SAFETY' with 360 items (8.99%), MEDICAL SCIENCES – ENDOCRINOLOGY' with 235 items (5.87%) and 'NUTRITION AND DIETETICS' with 79 items (1.97%) respectively. The frequency of occurrence of items in other subjects is less than 1%. The total number of subjects covering the periodicals were 27 in the field of 'Cardiovascular Diseases'.

TABLE – 6

Subjectwise Distribution

S. No.	Rank	Subject Area	Frequency Occurrence	Frequency (%)	Cumulative Frequency (%)
1.	1	Medical Sciences-Cardiovascular Diseases	1720	42.97	42.97
2.	2	Medical Sciences	1249	31.20	74.17
3.	3	Public Health and Safety	360	8.99	83.16
4.	4	Medical Sciences-Endocrinology	235	5.87	89.03
5.	5	Nutrition and Dietetics	79	1.97	91.00
6.	6	Obstetrics & Gynecology	38	0.94	91.94
7.	7	Medical Sciences-Urology and Nephrology	36	0.89	92.83
8.	7	Pharmacy and Pharmacology	36	0.89	93.72
9.	8	Medical Sciences-Pediatrics	31	0.77	94.49
10.	9	Garontology and Geriatrics	23	0.57	95.06
11.	10	Industrial Health and Safety	18	0.44	95.50
12.	10	Medical Sciences-Psychiatry & Neurology	18.	0.44	95.94
13.	10	Medical Sciences-Sports Medicine	18	0.44	96.38
14.	11	Hospitals	14	0.34	96.72
15.	11	Medical Sciences-Abstracting, Bibliographies, Statistics	14	0.34	97.06
16.	12	Physiology	13	0.32	97.38
17.	13	Medical Sciences-Nurses and Nursing	12	0.29	97.67
18.	14	Medical Sciences-Respiratory Diseases	11	0.27	97.94
19.	14	Biology-Cytology and Histology	11	0.27	98.21
20.	14	Medical Sciences-Radiology and Nuclear Medicine	11	0.27	98.48
21.	15	Environmental Studies	10	0.24	98.72
22.	15	Hematology	10	0.24	98.96
23.	16	Biology-Biological Chemistry	08	0.19	99.15
24.	17	Chemistry	05	0.12	99.27
25.	18	Drug Abuse and Alcoholism	04	0.09	99.36
26.	19	Ethnic Interests	03	0.07	99.43
27.	20	Experimental Medicine, Laboratory Technique	02	0.04	99.47
28.	21	Unknown	13	0.32	99.79
		Total	**4002**	**99.79**	

7. Ranking of Authors

There are a number of authors in every subject. However, some of the authors are well known personalities in a given field. Therefore, it is important to know the eminent scientists in the field of 'Cardiovascular Diseases'. This information is useful for the librarians as well as the users. The names of authors and the number of contributions are given in Table – 7. From the analysis it was found that 1422 (35.5%) items were written by single author and 2580 (64.49%) items were written by multiple authors i.e. more than one (It may be noted that names for multiple authors were not given for each item in *Index Medicus*) This shows the present trend of research in which joint efforts are involved to complete a research work.

Although this study is not sufficient to yield the name of major contributors yet the present ranking list may be of considerable help to know the names of significant authors in 'Cardiovascular Diseases'.

The names of first three most productive authors are :

i) Krauss, RM. (10 items)

ii) Phillips, WT. (9 items)

iii) Gordon, NF. (8 items)

TABLE – 7

Ranking of Authors

S. No	Rank	Name of Author	Frequency
1	1	Krauss, RM	10
2	2	Phillips, WT	9
3	3	Gordon, NF	8
4	4	Ory,HW	7
5	5	Jones, SE	6
6	5	Niskanen, L	6
7	6	Cohn, PF	5
8	6	Coulter, TD	5
9	6	Eagle, KA	5
10	6	Sumeray, MS	5
11	6	Tanaka, H	5
12	7	Oman, D	4
13	7	Ginsburg, J	4
14	7	Thomas, JR	4
15	7	Mitchell, A	4
16	7	Perris, AL	4
17	7	Frishman, WH	4
18	7	Walker, BR	4
19	7	Moody, LY	4
20	7	Grimble,GK	4
21	7	Shennon, M	4
22	7	Prichard, S	4
23	7	Zakhari, S	4
24	7	Barton, S	4
25	7	Simpson, IA	4
26	7	Williams, CM	4
27	7	Unwin, N	4
28	7	Lewis, DR	4
29	8	Wang, JS	3
30	8	Wandor Sloten, J	3
31	8	Kunz, K	3
32	8	Hulscher, ME	3
33	8	Henderson, A	3
34	8	Moye, LA	3
35	8	Barker, DJ	3
36	8	Leibson, C	3
37	8	Dymond, D	3
38	8	Groves, BA	3
39	8	Pochard, F	3

40	8	Chahine, R	3
41	8	Michel, JB	3
42	8	Pilot, A	3
43	8	Sobrier, F	3
44	8	Bertrand, MF	3
45	8	Middeke, M	3
46	8	Stockhoff, AA	3
47	8	Heinzl, S	3
48	8	Hagen, B	3
49	8	With, M	3
50	8	Haisjack, M	3
51	8	Pan, WH	3
52	8	Julius, S	3
53	8	Mandrykin, Iuv	3
54	8	Gaidanko, GV	3
55	8	Nuzdina, MA	3
56	8	Kawaguchi, H	3
57	8	Miyazaki, H	3
58	8	Matsuoka, R	3
59	8	Ferrara, D	3
60	8	Willems, HP	3
61	8	Hasenfuss, G	3
62	8	Mann, J	3
63	8	Ovhed, J	3
64	8	Berra, H	3
65	8	Falcon, CR	3
66	8	Ortega, RM	3
67	8	Saez, T	3
68	8	Nazarenko, VR	3
69	8	Terao, A	3
70	8	Tobe, M	3
71	8	Bertrand, E	3
72	8	Kruse, HJ	3
73	8	Makarenko, VN	3
74	8	Kostina, ZI	3
75	8	Kuznetsov, NA	3
76	8	Suzuki, T	3
77	8	Harano, Y	3
78	8	Sakata, K	3
79	8	Arroys, JS	3
80	9	Cerasola, G	2
81	9	Alvarez-Salawalther, LA	2
82	9	Hurtado-Martin, J	2
83	9	Kuzentsov, GP	2

84	9	Assaf, AR	2
85	9	Skarda, RT	2
86	9	Allegra, V	2
87	9	Koller, A	2
88	9	Greenlund, KJ	2
89	9	Holdright, DR	2
90	9	Carek, PJ	2
91	9	Mosca, L	2
92	9	Chukwama, C Sr.	2
93	9	Cohn, JN	2
94	9	Wilcken, DF	2
95	9	Meleady, RA	2
96	9	Jackson, MM	2
97	9	Gylys, KH	2
98	9	Pahor, M	2
99	9	Eliot, HL	2
100	9	Clarke, R	2
101	9	Jarvelin, MR	2
102	9	Luoma, P.	2
102	9	Martikainen, H	2
104	9	Oparil, S	2
105	9	Wilmshurst, P	2
106	9	Smith, CJ	2
107	9	Waltzer, KB	2
108	9	Gulekli, B	2
109	9	Tran, PD	2
110	9	Rumbolt, Z	2
111	9	Elming, H	2
112	9	Adachi, H	2
113	9	Passa, P	2
114	9	Lefebure, PJ	2
115	9	Barett-Connor, E	2
116	9	Niskamen, L	2
117	9	Taskinen, MR	2
118	9	Howard, BV	2
119	9	Haffiner, SM	2
120	9	Himmelmann, A	2
121	9	Hingorani, AD	2
122	9	Rao, R	2
123	9	Troger, U	2
124	9	Doevendans, PA	2
125	9	Carmeliet, P	2
126	9	Rabelink, TJ	2
127	9	Janse, MJ	2

128	9	Xhingnesse, M	2
129	9	Canadian Cardiovascular Society	2
130	9	Steele, B	2
131	9	Taylor, BV	2
132	9	Smith, ER	2
133	9	American Heart Association	2
134	9	Brattstrom, L	2
135	9	Daniels, SR	2
136	9	Pepine CJ	2
137	9	Morishita, R	2
138	9	Pang, CP	2
139	9	Ahen, X	2
140	9	Winocour, PH	2
141	9	Yla-Hertthala, S	2
142	9	Rafsum, H	2
143	9	Kornitzer, M	2
144	9	Dominiczak, MH	2
145	9	Kuller, L	2
146	9	Denarie, N	2
147	9	Cook, JP	2
148	9	Villa, E	2
149	9	Smith, SC Jr.	2
150	9	Cushman, WC	2
151	9	Parving, HH	2
152	9	Mogensen, CE	2
153	9	Mason, RP	2
154	9	Monicia, G	2
155	9	Grand, A	2
156	9	Gosse, P	2
157	9	Frey, J	2
158	9	Beaufils, M	2
159	9	Blacher, J	2
160	9	Benetos, A	2
161	9	Asmar, R	2
162	9	Siche, JP	2
163	9	European Society of Cardiology	2
164	9	Mounier-Vehier, C	2
165	9	Guize, L	2
166	9	Steven, ID	2
167	9	Sharabi, Y	2
168	9	Burke, V	2
169	9	Rodriguez Herrera, N	2
170	9	Twisk, JW	2
171	9	Meigs, JB	2

172	9	Pashas, CL	2
173	9	Basser, R	2
174	9	Hulin, MS	2
175	9	Evans, SJ	2
176	9	Simopoulos, AP	2
177	9	Hompton, R	2
178	9	Wanecek, M	2
179	9	Stoschitzky, K	2
180	9	Chan, B	2
181	9	Breslow, JL	2
182	9	Woodward, M	2
183	9	Rotini, C	2
184	9	Pelit, JM	2
185	9	Li, Y	2
186	9	Ernst, ND	2
187	9	Wild, RA	2
188	9	Jorde, VP	2
189	9	Le, NA	2
190	9	Grunbaum, JA	2
191	9	Hales, CN	2
192	9	Julien, J	2
193	9	Yudkin, JS	2
194	9	Kane, A	2
195	9	Neimark, MI	2
196	9	Scatt, R	2
197	9	Davis, S	2
198	9	Bjarnason, NH	2
199	9	Gasser, R	2
200	9	Hannah, JS	2
201	9	Nobel, EG	2
202	9	Carmelier, P	2
203	9	Nighoghossian, N	2
204	9	Emder, P	2
205	9	Brever, HW	2
206	9	Rosa-Jimenez, F	2
207	9	Kris-Etherton, PM	2
208	9	Pearson, TA	2
209	9	Schaefer, EJ	2
210	9	Dressler, WW	2
211	9	Corti, MC	2
212	9	Portuese, EI	2
213	9	Vaya, A	2
214	9	Kochmanski, M	2

CHAPTER – V

APPLICATION OF BIBLIOMETRIC LAWS

After the interpretation of data, the next step is the application of bibliometric laws on the analyzed data to check the validity of these laws

1. BRADFORD'S LAW OF SCATTERING

This states that "If scientific periodicals are arranged in order of decreasing productivity of articles on a given subject that may be divided into a nucleus of periodicals more particularly devoted to the subject and several groups or zones containing the same number of articles as the nucleus when the number of periodicals in the nucleus and succeeding zones will be given as" :

$$1 : n : n^2$$

Where, 1 is the number of journals in the nucleus and n is a multiplier. To check the validity of this law, 812 journals were divided into three zones, according to their productivity

In the first zone, 11 journals contained 1345 items, in the second zone, 83 journals contained 1332 items and remaining 718 journals contained 1325 items in the third zone. According to this, the periodicals in each zone covered approximately 1/3 items of the total. For all this, data has been taken from Table – 1. The analysis shows, phenomenon of scattering of items in different zones of journals.

The first zone is the nucleus zone as it contains 11 periodicals, followed by 83 periodicals in second zone and 718 periodicals in third zone. The zones, thus identified will form an approximately geometric series as given below :

$$11 : 83 : 718$$

Here, $83 \cong 88 = 11 \times 8$ (Approx.)

$718 \cong 704 = 11 \times 8 \times 8$ (Approx.)

Therefore, now the series is

$$11 : 11 \times 8 : 11 \times 8 \times 8$$

on substituting $8 = n$

We get, $11 : 11n : 11n^2$

i.e. $1 : n : n^2$

i.e. $1 : n : n^2$ (where 1 is the number of periodicals in the nucleus and n is a multiplier)

The Bradford's Law is proved thus.

TABLE – 8

Bradford's Table

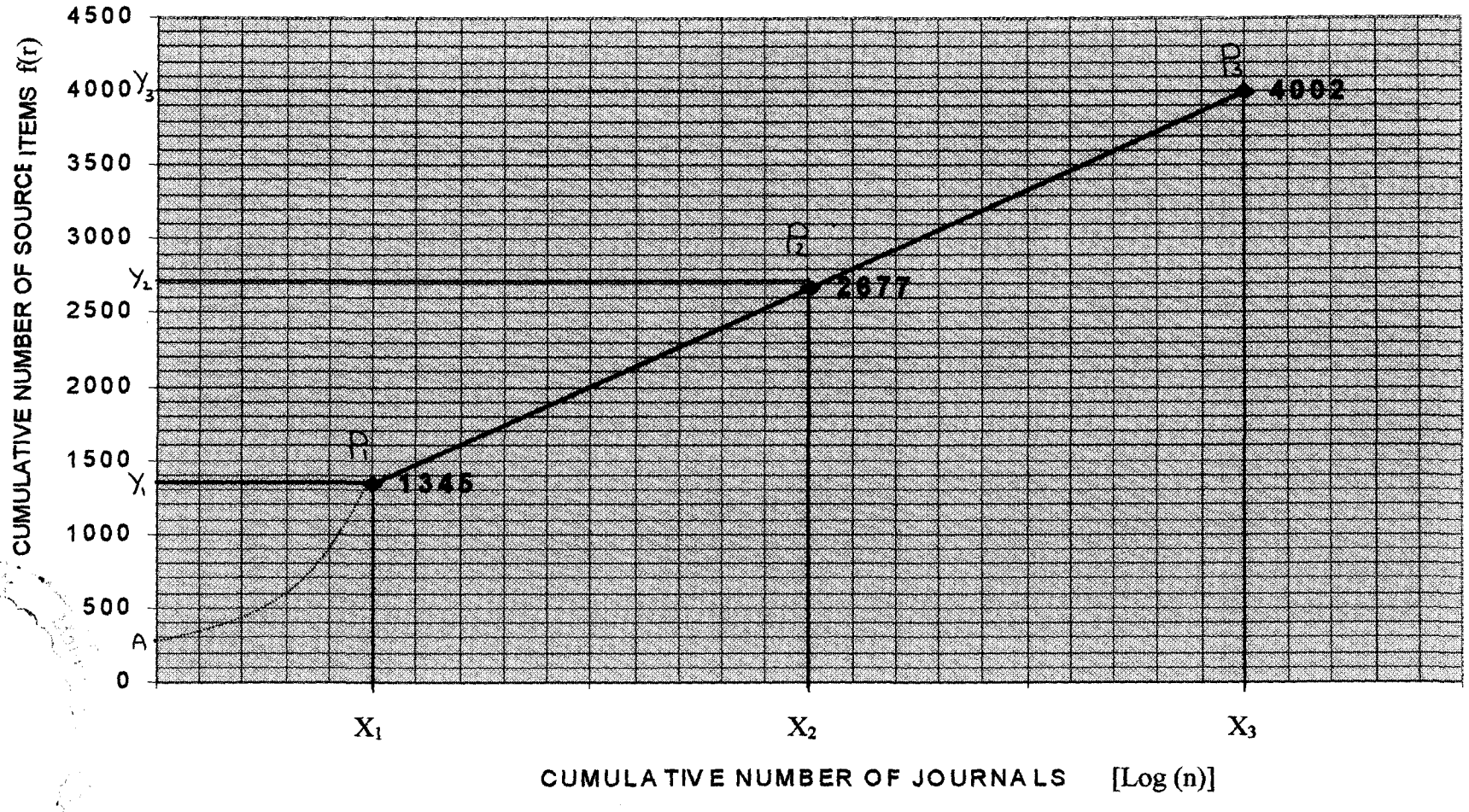
S.No.	No. of Journals	Cumulation of Journals	No. of Items	Cumulation of Items
1.	1	1	268	268
2.	1	2	151	419
3.	1	3	121	540
4.	1	4	120	660
5.	1	5	110	770
6.	1	6	107	877
7.	1	7	99	976
8.	1	8	95	1071
9.	1	9	94	1165
10.	1	10	93	1258
11.	1	11	87	1345
	11		**1345**	
12.	2	13	110	1455
13.	3	16	140	1595
14.	4	20	139	173
15.	5	25	139	1873
16.	6	31	140	2013
17.	6	37	120	2133
18.	7	44	123	2256
19.	7	51	108	2364
20	7	88	82	2446
21	8	66	69	2515
22	9	75	63	2578
23	9	84	49	2627
24	10	94	50	2677
	83		**1332**	
25.	14	108	56	2733
26.	27	135	107	2840
27.	31	166	93	2933
28.	48	214	120	3053
29.	53	267	106	3159
30	60	327	120	3279
31.	65	392	130	3409
32.	86	478	172	3581
33.	87	565	174	3755
34.	123	688	123	3878
35.	124	812	124	4002
	718		**1325**	

The number of journals in the nucleus can be obtained by plotting f(r) and log n on semi logarithmic graph paper (a bibliograph), where f(r) is cumulative frequency and log n is log of rank of journals as shown in the graph. This graph is drawn with the help of data analyzed and computed in table – 8.

The log value of 11 journals in the first zone is 1.0414. The log value of 83 journals in the second zone is 1.9191and the log value of 718 journals in the third zone is 2.8561.

Taking log n on x-axis and number of items in each zone on Y-axis a graph was plotted as shown. The bibliograph thus obtained is found to be, by and large, similar to Bradford's bibliograph. As the graph begins as a rising curve AP_1 and continues as a straight line. The rising part of the graph represents the nucleus of highly productive journals. The point P1, P2 and P3 on the bibliograph are the boundaries of three equi-productive zones in which almost the same number of articles as the nucleus (represented by $OY_1 = Y_1 Y_2 = Y_2 Y_3$) derived from an increasingly larger number of journals (represented by OX_1, X_1X_2 and X_2X_3). The Bradford's Law is proved thus.

DIAGRAM-6 BRADFORD'S BIBLIOGRAPH



2. LOTKA'S INVERSE SQUARE LAW

The Lotka's inverse square law states that the number of scientists who contribute n papers will be $1/n^2$ of those who contributed only one paper. During the present analysis it was observed that 3,654 authors have contributed 4,002 items. Out of 3,654 contributors, only 214 authors have contributed more than one paper and rest 3,440 authors have contributed only one paper each giving single contribution. However, according to Lotka's law, single contributors should account for 60% of the total.

Lotka's law was applied to know the number of scientists contributing 2 papers, 3 papers and 4 papers respectively, as given below :

2.1 Scientists Contributing Two papers

As we know the number of authors contributing only one paper is 3,440, the number of scientists contributing 2 papers may be calculated by the formula

$$\text{No. of scientists publishing n papers} = \frac{\text{No. of Scientists publishing 1 paper}}{n^2}$$

On substituting, n = 2 in the above formula

$$\text{No. of scientists publishing 2 papers} = \frac{3,440}{2^2}$$

$$= \frac{3,440}{4}$$

$$= 860$$

The number of scientists publishing 2 papers should be 860. However, an analysis of the data indicates that only 135 authors have contributed 2 papers which is far less than the figure, obtained by applying Lotka's Law.

2.2 Scientists Contributing Three papers

On substituting, $n = 3$ in the formula we get,

$$\text{No. of scientists publishing 3 papers} = \frac{3,440}{3^2}$$

$$= \frac{3,440}{9}$$

$$= 382.22 \cong 382$$

During the analysis it was found that only 51 authors contributed 3 papers each, which is again far less than the calculated figure i.e. 382.

2.3 Scientists contributing four papers

On substituting, $n = 4$ in the formula we get

$$\text{No. of scientists publishing 4 papers} = \frac{3,440}{4^2}$$

$$= \frac{3,440}{16}$$

$$= 215$$

The analysis of the actual data shows that only 17 authors contributed 4 papers which is again far less than the calculated figure i.e. 215.

It may, therefore, be concluded that the trends of research nowadays have changed as compared to the period when Lotka's law was formulated. That is why on the basis of the analysis of the present data it is difficult to testify the validity of Lotka's law.

3. ZIPF'S LAW OF WORD OCCURRENCE

This law states that "In a long textual matter if words are arranged in their decreasing order of frequency, then the rank of any given word of the text will be inversely proportional to the frequency of occurrence of the word.

$$r \propto 1/f \quad \text{(where, r is rank and f is frequency)}$$

$$\therefore \quad r = c/f \quad \text{(where c is constant)}$$

taking log on both the sides

$$\log(r) = \log(c) - \log(f)$$

or $$\log(f) + \log(r) = c' \quad \text{(where c' is a constant)}$$

To apply this law, the words (Terms) were collected from the title of the articles and ranked according to their frequency of occurrence in decreasing order. Only those words occurring up to 147 times are given in the Table – 9 .

On application of this law, it is found that log of frequency of occurrence of words when added to log of their rank, the results are almost same for each word :

1. **Word – Cardiovascular, Frequency – 1001 times, Rank – 1**

log of frequency + log of rank

$$\log 1001 + \log 1 = 3.0004 + 0$$

$$= 3.0004$$

2. **Word – Cardiovascular, Frequency – 506 times, Rank – 2**

log of frequency + log of rank

$$\log 506 + \log 2 = 2.7041 + 0.3010$$

$$= 3.0051$$

3. **Word – Risk, Frequency – 431 times, Rank – 3**

log of frequency + log of rank

$$\log 431 + \log 3 = 2.6345 + 0.4771$$

$$= 3.1116$$

Thus, it is proved that Zipf's law holds good even today.

TABLE – 9

Ranking of Word Occurrence

S.No.	Rank	Words	Frequency	Log(c)
1.	1	Cardiovascular	1001	3.0004
2.	2	Disease	506	3.0051
3.	3	Risk	431	3.1116
4.	4	Control	410	3.2149
5.	5	Changes	369	3.2660
6.	6	Care	352	3.3247
7.	7	Patient	351	3.3904
8.	8	Effects	334	3.4268
9.	9	Cardiology	320	3.4593
10.	10	Diabetes	291	3.4639
11.	11	Prevention	289	3.5023
12.	12	Medicine	284	3.5325
13.	13	System	265	3.5361
14.	14	Factors	244	3.5335
15.	15	Smoking	238	3.5527
16.	16	Practice	229	3.5639
17.	17	Chemotherapy	207	3.5464
18.	18	Method	198	3.5520
19.	19	Drug	189	3.5553
20.	20	Clinical	179	3.5539
21.	21	Life	163	3.5344
22.	22	Therapy	147	3.5097

CHAPTER – VI

CONCLUSIONS AND IMPLICATIONS

The main objective of the bibliometric study is to know the leading countries, contributors, form of documents, language, core periodicals etc. in the subject 'Cardiovascular Diseases'. This whole study was conducted by using bibliometric technique. After the collection of data from *Index Medicus*, it was analysed and results were shown in the form of tables and graphs. Lastly, bibliometric laws were tested.

The following are the major findings of the study :

1. From the bibliometric study it is found that the journal titled '***Circulation***' published from USA is most productive, reporting 268 items i.e. 6.7% of the total. This is followed by '***Diabetes Care***' published from USA with 151 items i.e. 3.77% of the total and '***Journal of Cardiovascular Risk***' publication of England with 121 items i.e. 3.02% of the total.

2. The literature on 'Cardiovascular Diseases' was found to be published from 51 countries. USA is the leading country with 1248 (31.18%) items of the total. This is followed by England and Germany with 876 (21.88%) and 322 (8.04%) items respectively.

3. From the study dealing with year wise distribution of items (Table-3), it is found that 802, 811, 1302 and 1087 items were reported in the volume of 1996, 1997, 1998 and 1999 of *Index Medicus* respectively. The analysis of yearwise distribution concludes that highest amount of documents were produced in the year 1998 with 1355 items on the subject 'Cardiovascular Diseases'. The other productive years are 1997 and 1999 accounting for 813 and 956 items respectively. This study shows how currently information is being published by *Index Medicus*.

4. Language wise analysis concludes that English is one of the languages which is used very frequently by the contributors, as about 3195 (79.83%) documents on the subject 'Cardiovascular Diseases' were published in English. It is followed by Russian and Japanese with 202 (5.04%) and 177 (4.42%) items respectively.

5. Form wise distribution shows that the articles are the most popular form of documents which are used by scientists of the 'Cardiovascular Diseases'. Out of the 4,002 items, there were 3689 (92.17%) items published in article form. It is followed by conference proceedings and meeting reports with 154 (3.84%) and 96 (2.39%) items respectively.

6. From the subjectwise analysis it is found that 1720 (42.97%) items belong to the subject 'MEDICAL SCIENCES–CARDIOVASCULAR DISEASES' and 1249 (31.20%) items are related to the subject 'MEDICAL SCIENCES'. It is followed by the subject 'PUBLIC HEALTH AND SAFETY' with 360 (8.99%) items.

7. Authorwise analysis has been done to know the contributors who produced most of the documents. It was found out that 1422 items were produced by single author and 2580 items were produced by more than one authors. Joint authorship was found to be more popular in the subject 'Cardiovascular Diseases'. The first three ranked authors (all from USA) are

   i) Krauss, RM (10 items)

   ii) Phillips, WT (9 items)

   iii) Gordon, NF (8 items)

In short, in the field of 'Cardiovascular Diseases', USA is the leading country by producing most of the literature in the form of articles that are published in well known language i.e. English.

During the application of Bibliometric Laws, Bradford's Law and Zipf's Law were proved. However, Lotka's Law could not be testified probably because of the changing trends of research nowadays.

BIBLIOGRAPHY

1. Braunwald, E. – Heart Disease. – 5th ed. – Philadelphia : W.B. Sounders Company, 1977; 877-1007.

2. Chung, E.K. – Quick References to Cardiovascular Diseases. – 2nd ed. – Philadelphia : J.B. Lippincott Company, 1980; 158-349, 414-605.

3. Devarajan, G. – Bibliometric Studies. – New Delhi : Ess Ess Publication, 1997.

4. Egghe, L. – Methodological Aspects of Bibliometrics, Library Science and Slant to Documentation and Information Studies, 25:3:1988; 179-91.

5. Fairthone, R.A. – Empirical Hyperbolic Distribution for Bibliometric Description and Prediction, Journal of Documentation, 25: 1969; 319-43.

6. Pritchard, A. – Statistical Bibliography on Bibliometrics, Journal of Documentation, 25, 1969; 348-49.

7. Wasir, H.S. – Heart to Heart. – New Delhi : Vikas Publishing House, 1992; 1-9.